

10/17/2011

## RECORDATION FORM COVER SHEET

U.S. DEPARTMENT OF COMMERCE

Patent and Trademark Office



103634616

Patent and Trademark Office: Please record the attached documents or the new address(es) below.

## 1. Name of conveying party(ies):

NV Bekaert SA

## 2. Name and address of receiving party(ies):

Name: Sulzer Metaplas GmbHAddress: 51427 Bergisch Gladbach

Additional names(s) of conveying party(ies)

☐ Yes ☒ No

## 3. Nature of conveyance/Execution Date(s):

Execution Date(s): August 23, 2010☒ Assignment☐ Merger☐ Security Agreement☐ Change of Name☐ Joint Research Agreement☐ Government Interest Assignment☐ Executive Order 9424, Confirmatory License☐ OtherCity: Am Boettcherberg 30-38

State/Prov.: \_\_\_\_\_

Country: GERMANY

ZIP: \_\_\_\_\_

Additional name(s) &amp; address(es) attached?

☐ Yes ☒ No

## 4. Application or patent numbers(s):

A. Patent Application No. (s)

☐ This document is being filed together with a new application.

B. Patent No.(s)

6,013,980

Additional numbers attached?

☐ Yes ☒ No

## 5. Name and address to whom correspondence concerning document should be mailed:

Name: Peter Rogalskyj, Esq.Registration No.: 38,601Address: P.O. Box 44City: LivoniaState/Prov.: New YorkCountry: U.S.A. ZIP: 14487-0044Phone Number: 585-346-1004Fax Number: 585-346-1001

Email Address: \_\_\_\_\_

6. Total number of applications and patents involved: 17. Total fee (37 CFR 1.21(h) & 3.41) \$ 40.00☒ Authorized to be charged by credit card☐ Authorized to be charged to deposit account☐ Enclosed☐ None required (government interest not affecting title)

## 8. Payment Information

a. Credit Card Last 4 Numbers See enclosed PTO-203810/18/2011 AMULLINS 00000000 6013980

Expiration Date

b. Deposit Account Number

40.00 DP

Authorized User Name \_\_\_\_\_

## 9. Signature:

Peter Rogalskyj

Name of Person Signing

October 12, 2011

Date

Total number of pages including cover sheet, attachments, and document:

38

PATENT

REEL: 027191 FRAME: 0187

## AKTE VAN AFSTAND – ASSIGNMENT - ACTE DE CESSION

Met deze overeenkomst verklaart NV BEKAERT SA, met zetel te  
We, NV BEKAERT SA, having its registered office at  
Par la présente, la société NV BEKAERT SA, avec siege à

8550 Zwevegem, Bekaertstraat 2, België,  
8550 Zwevegem, Bekaertstraat 2, Belgium,  
8550 Zwevegem, Bekaertstraat 2, Belgique,

afstand te doen van de industriële eigendomstitels vermeld in Bijlage,  
declares to assign the industrial property titles mentioned in Annex,  
déclare de céder les titres de propriété intellectuelle mentionnés à l'Annexe,

in ruil voor een ontvangen vergoeding,  
for value received,  
en échange d'une contre-valeur reçue,

ten voordele van Sulzer Metaplas GmbH, met zetel  
in favour of Sulzer Metaplas GmbH, having its registered office at  
à l'avantage de Sulzer Metaplas, avec siege à

51427 Bergisch Gladbach, Am Boettcherberg 30-38, Duitsland,  
51427 Bergisch Gladbach, Am Boettcherberg 30-38, Germany,  
51427 Bergisch Gladbach, Am Boettcherberg 30-38, Allemagne,

die deze eigendomsrechten aanvaardt.  
accepting these rights of industrial property.  
qui accepte ces droits de propriété.

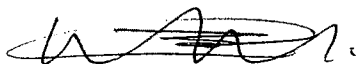
Als gevolg hiervan wordt Sulzer Metaplas GmbH de enige en uitsluitende eigenaar  
Therefore, Sulzer Metaplas GmbH, becomes the sole proprietor  
Par consequent, Sulzer Metaplas GmbH, devient le seul et exclusif propriétaire

van de genoemde titels.  
of these mentioned titles.  
de ces titres mentionnés.

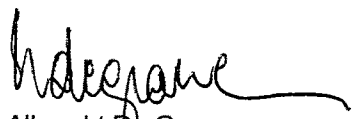
Opgemaakt te Zwevegem, België, op 23 augustus 2010.  
Drawn up at Zwevegem, Belgium, on 23 August 2010.  
Fait à Zwevegem, Belgique, le 23 août 2010.

NV BEKAERT SA

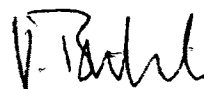
Sulzer Metaplas GmbH



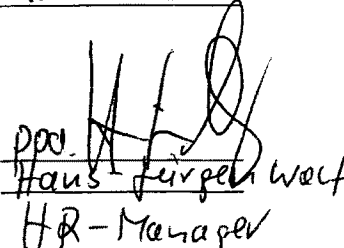
Bruno Humblet  
Group Executive Vice President



Albrecht De Graeve  
Chief Executive Officer



Valentin Buhle



Hans-Jürgen Wolf  
HR-Manager

**PATENT**

**REEL: 027191 FRAME: 0188**

donderdag 25 februari 2010

## Master List

Page: 1

Case Number: 03797

Title: IMPROVED DIAMOND-LIKE NANOCOMPOSITE

Client: IC DLC TRIBOLOGICAL COATINGS

Owner: NV Bekaert SA

Disclosure Status: Filed

Disclosure Date:

Attorney(s): KH

| Country                                                     | Sub Case | Case Type | Status | Application Number | Filing Date | Pub Number  | Patent Number | Issue Date  | Expiration  |
|-------------------------------------------------------------|----------|-----------|--------|--------------------|-------------|-------------|---------------|-------------|-------------|
| Belgium                                                     | EPC      | Granted   |        | 97920688.5         | 11-apr-1997 | 896640      | 896640        | 06-feb-2002 | 11-apr-2017 |
| App.Title: IMPROVED DIAMOND-LIKE NANOCOMPOSITE COMPOSITIONS |          |           |        |                    |             |             |               |             |             |
| France                                                      | EPC      | Granted   |        | 97920688.5         | 11-apr-1997 | 896640      | 896640        | 06-feb-2002 | 11-apr-2017 |
| Owner: NV Bekaert SA                                        |          |           |        |                    |             |             |               |             |             |
| Germany                                                     | EPC      | Granted   |        | 97920688.5         | 11-apr-1997 | 896640      | 69710324.2-08 | 06-feb-2002 | 11-apr-2017 |
| App.Title: IMPROVED DIAMOND-LIKE NANOCOMPOSITE COMPOSITIONS |          |           |        |                    |             |             |               |             |             |
| Owner: NV Bekaert SA                                        |          |           |        |                    |             |             |               |             |             |
| Japan                                                       | PCT      | Granted   |        | 537689/97          | 11-apr-1997 | 2000-508713 | 4439594       | 15-jan-2010 | 11-apr-2017 |
| App.Title: IMPROVED DIAMOND-LIKE NANOCOMPOSITE COMPOSITIONS |          |           |        |                    |             |             |               |             |             |
| Owner: NV Bekaert SA                                        |          |           |        |                    |             |             |               |             |             |
| Luxembourg                                                  | EPC      | Granted   |        | 97920688.5         | 11-apr-1997 | 896640      | 896640        | 06-feb-2002 | 11-apr-2017 |
| App.Title: IMPROVED DIAMOND-LIKE NANOCOMPOSITE COMPOSITIONS |          |           |        |                    |             |             |               |             |             |
| Owner: NV Bekaert SA                                        |          |           |        |                    |             |             |               |             |             |
| Netherlands                                                 | EPC      | Granted   |        | 97920688.5         | 11-apr-1997 | 896640      | 896640        | 06-feb-2002 | 11-apr-2017 |
| App.Title: IMPROVED DIAMOND-LIKE NANOCOMPOSITE COMPOSITIONS |          |           |        |                    |             |             |               |             |             |
| Owner: NV Bekaert SA                                        |          |           |        |                    |             |             |               |             |             |
| Taiwan                                                      | ORD      | Granted   |        | 86105584           | 26-apr-1997 | 420724      | 126613        | 28-mei-2001 | 26-apr-2017 |
| App.Title: IMPROVED DIAMOND-LIKE NANOCOMPOSITE COMPOSITIONS |          |           |        |                    |             |             |               |             |             |
| Owner: NV Bekaert SA                                        |          |           |        |                    |             |             |               |             |             |
| United States of America                                    | PCT      | Granted   |        | 9/171614           | 11-apr-1997 |             | 6200675       | 13-mrt-2001 | 11-apr-2017 |
| App.Title: IMPROVED DIAMOND-LIKE NANOCOMPOSITE COMPOSITIONS |          |           |        |                    |             |             |               |             |             |
| Owner: NV Bekaert SA                                        |          |           |        |                    |             |             |               |             |             |

Abstract: The invention relates to an improved diamond-like nanocomposite composition comprising interpenetrating networks of a-C:H and a-Si:O wherein the H-concentration is between 40 % and 80 % of the C-concentration and having a coefficient of friction against steel which is smaller than 0.1 in air with a relative humidity up to 90 %.

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[Brussels #472574 v1]

donderdag 25 februari 2010

## Master List

Page: 2

Case Number: 03797

### Abstract:

The invention relates to an improved diamond-like nanocomposite composition comprising interpenetrating networks of a-C:H and a-Si:O wherein the H-concentration is between 40 % and 80 % of the C-concentration and having a coefficient of friction against steel which is smaller than 0.1 in air with a relative humidity up to 90 %, respectively in water. The invention relates also to a process for depositing the composition on a substrate in a vacuum chamber. The composition comprises preferably 30 to 70 at% of C, 20 to 40 at% of H, 5 to 15 at% of Si and 5 to 15 at% of O and can be doped with transition metals.

### Priorities

| Country | Case Type | Application # | Filing Date |
|---------|-----------|---------------|-------------|
|         |           |               | 22-apr-1996 |

[Brussels #472574 v1]

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donderdag 25 februari 2010

## Master List

Page: 3

Case Number: 04022

Title: DLN - DLC STACKS  
Client: IC DLC TRIBOLOGICAL COATINGS  
Owner: NV Bekaert SA

Disclosure Status: Filed

Disclosure Date:

Attorney(s): KH

| Country | Sub Case                                             | Case Type | Status  | Application Number | Filing Date | Pub Number | Patent Number | Issue Date  | Expiration  |
|---------|------------------------------------------------------|-----------|---------|--------------------|-------------|------------|---------------|-------------|-------------|
| Austria | App. Title: DLN - DLC STACKS<br>Owner: NV Bekaert SA | EPC       | Granted | 98908033.8         | 23-jan-1998 | 963455     | 963455        | 02-jan-2002 | 23-jan-2018 |
| Belgium | App. Title: DLN - DLC STACKS<br>Owner: NV Bekaert SA | EPC       | Granted | 98908033.8         | 23-jan-1998 | 963455     | 963455        | 02-jan-2002 | 23-jan-2018 |
| Canada  | App. Title: DLN - DLC STACKS<br>Owner: NV Bekaert SA | PCT       | Granted | 2277977            | 23-jan-1998 | 98/33948   | 2277977       | 31-okt-2006 | 23-jan-2018 |
| France  | App. Title: DLN - DLC STACKS<br>Owner: NV Bekaert SA | EPC       | Granted | 98908033.8         | 23-jan-1998 | 963455     | 963455        | 02-jan-2002 | 23-jan-2018 |
| Germany | App. Title: DLN - DLC STACKS<br>Owner: NV Bekaert SA | EPC       | Granted | 98908033.8         | 23-jan-1998 | 963455     | 69803365.5-08 | 02-jan-2002 | 23-jan-2018 |
| India   | App. Title: DLN - DLC STACKS<br>Owner: NV Bekaert SA | ORD       | Granted | 267/DEL/98         | 02-feb-1998 |            | 215335        | 25-feb-2008 | 02-feb-2018 |
| Italy   | App. Title: DLN - DLC STACKS<br>Owner: NV Bekaert SA | EPC       | Granted | 98908033.8         | 23-jan-1998 | 963455     | 48690/BE/2002 | 02-jan-2002 | 23-jan-2018 |
| Japan   | App. Title: DLN - DLC STACKS<br>Owner: NV Bekaert SA | PCT       | Granted | 532542/1998        | 23-jan-1998 | 98/33948   | 4256938       | 06-feb-2009 | 23-jan-2018 |

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[Brussels #472574 v1]

donderdag 25 februari 2010

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Case Number: 04022

| Country                            | Sub Case         | Case Type | Status  | Application Number | Filing Date | Pub Number | Patent Number | Issue Date  | Expiration  |
|------------------------------------|------------------|-----------|---------|--------------------|-------------|------------|---------------|-------------|-------------|
| Luxembourg                         | DLN - DLC STACKS | EPC       | Granted | 98908033.8         | 23-jan-1998 | 963455     | 963455        | 02-jan-2002 | 23-jan-2018 |
| <i>App.Title: DLN - DLC STACKS</i> |                  |           |         |                    |             |            |               |             |             |
| <i>Owner: NV Bekaert SA</i>        |                  |           |         |                    |             |            |               |             |             |
| Netherlands                        | DLN - DLC STACKS | EPC       | Granted | 98908033.8         | 23-jan-1998 | 963455     | 963455        | 02-jan-2002 | 23-jan-2018 |
| <i>App.Title: DLN - DLC STACKS</i> |                  |           |         |                    |             |            |               |             |             |
| <i>Owner: NV Bekaert SA</i>        |                  |           |         |                    |             |            |               |             |             |
| Spain                              | DLN - DLC STACKS | EPC       | Granted | 98908033.8         | 23-jan-1998 | 963455     | 2171010 T3    | 02-jan-2002 | 23-jan-2018 |
| <i>App.Title: DLN - DLC STACKS</i> |                  |           |         |                    |             |            |               |             |             |
| <i>Owner: NV Bekaert SA</i>        |                  |           |         |                    |             |            |               |             |             |
| Switzerland                        | DLN - DLC STACKS | EPC       | Granted | 98908033.8         | 23-jan-1998 | 963455     | 963455        | 02-jan-2002 | 23-jan-2018 |
| <i>App.Title: DLN - DLC STACKS</i> |                  |           |         |                    |             |            |               |             |             |
| <i>Owner: NV Bekaert SA</i>        |                  |           |         |                    |             |            |               |             |             |
| United Kingdom                     | DLN - DLC STACKS | EPC       | Granted | 98908033.8         | 23-jan-1998 | 963455     | 963455        | 02-jan-2002 | 23-jan-2018 |
| <i>App.Title: DLN - DLC STACKS</i> |                  |           |         |                    |             |            |               |             |             |
| <i>Owner: NV Bekaert SA</i>        |                  |           |         |                    |             |            |               |             |             |
| United States of America           | DLN - DLC STACKS | PCT       | Granted | 09/341704          | 23-jan-1998 |            | 6228471       | 08-mei-2001 | 23-jan-2018 |
| <i>App.Title: DLN - DLC STACKS</i> |                  |           |         |                    |             |            |               |             |             |
| <i>Owner: NV Bekaert SA</i>        |                  |           |         |                    |             |            |               |             |             |

**Abstract:** The invention relates to a substrate (1) covered at least in part with a coating (6) comprising a number of layered structures (2) each such structure comprising a first diamond like nanocomposite composition layer (3) closest to the substrate, which composition comprises interpenetrating networks of a-C:H and a-Si:O, a second diamond like carbon composition layer (4) on top of said first layer, a transition layer (5) between said first and second layer comprising a mixture of said diamond like nanocomposite and said diamond like carbon compositions; and when the number of layered structures (2) is greater than one, then the coating (6) comprises an intermediate layer (7) comprising a mixture of said diamond like carbon and diamond like nanocomposite compositions sandwiched between each pair of consecutive layered structures (2). It also relates to a process for manufacturing such a covered substrate.

The invention combines the advantages of both DLC and DLN :  
- DLN : low friction, better anti-sticking properties + better adhesion  
- DLC : higher hardness

### Priorities

| Country                    | Case Type | Application # | Filing Date |
|----------------------------|-----------|---------------|-------------|
| European Patent Convention |           |               | 04-feb-1997 |

[Brussels #472574 v1]

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donderdag 25 februari 2010

## Master List

Page: 5

Case Number: 04205

Title: NON-STICKING DYLYN

Client: IC DLC TRIBOLOGICAL COATINGS

Owner: NV Bekaert SA

Disclosure Status: Filed

Disclosure Date:

Attorney(s): KH

| Country     | Sub Case | Case Type          | Status    | Application Number | Filing Date | Pub Number  | Patent Number | Issue Date  | Expiration  |
|-------------|----------|--------------------|-----------|--------------------|-------------|-------------|---------------|-------------|-------------|
| Belgium     | EPC      | NON-STICKING DYLYN | Granted   | 98933636.7         | 15-jun-1998 | 988406      | 988406        | 29-mei-2002 | 15-jun-2018 |
| Canada      | PCT      | NON-STICKING DYLYN | Granted   | 2294420            | 15-jun-1998 | 98/59089    | 2294420       | 13-mrt-2007 | 15-jun-2018 |
| France      | EPC      | NON-STICKING DYLYN | Granted   | 98933636.7         | 15-jun-1998 | 988406      | 988406        | 29-mei-2002 | 15-jun-2018 |
| Germany     | EPC      | NON-STICKING DYLYN | Granted   | 98933636.7         | 15-jun-1998 | 988406      | 69805618.3-08 | 29-mei-2002 | 15-jun-2018 |
| Italy       | EPC      | NON-STICKING DYLYN | Granted   | 98933636.7         | 15-jun-1998 | 988406      | 50550/BE/2002 | 29-mei-2002 | 15-jun-2018 |
| Japan       | PCT      | NON-STICKING DYLYN | Published | 503770/1999        | 15-jun-1998 | 2002-504960 |               |             |             |
| Luxembourg  | EPC      | NON-STICKING DYLYN | Granted   | 98933636.7         | 15-jun-1998 | 988406      | 988406        | 29-mei-2002 | 15-jun-2018 |
| Netherlands | EPC      | NON-STICKING DYLYN | Granted   | 98933636.7         | 15-jun-1998 | 988406      | 988406        | 29-mei-2002 | 15-jun-2018 |

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[Brussels #472574 v1]

donderdag 25 februari 2010

Case Number: 04205

## Master List

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| Country                               | Sub Case | Case Type | Status  | Application Number | Filing Date | Pub Number | Patent Number | Issue Date  | Expiration  |
|---------------------------------------|----------|-----------|---------|--------------------|-------------|------------|---------------|-------------|-------------|
| Switzerland                           |          | EPC       | Granted | 98933636.7         | 15-jun-1998 | 988406     | 988406        | 29-mei-2002 | 15-jun-2018 |
| <i>App. Title:</i> NON-STICKING DYLYN |          |           |         |                    |             |            |               |             |             |
| <i>Owner:</i> NV Bekaert SA           |          |           |         |                    |             |            |               |             |             |
| United Kingdom                        |          | EPC       | Granted | 98933636.7         | 15-jun-1998 | 988406     | 988406        | 29-mei-2002 | 15-jun-2018 |
| <i>App. Title:</i> NON-STICKING DYLYN |          |           |         |                    |             |            |               |             |             |
| <i>Owner:</i> NV Bekaert SA           |          |           |         |                    |             |            |               |             |             |
| United States of America              |          | PCT       | Granted | 09/446308          | 15-jun-1998 |            | 6472062       | 29-okt-2002 | 15-jun-2018 |
| <i>App. Title:</i> NON-STICKING DYLYN |          |           |         |                    |             |            |               |             |             |
| <i>Owner:</i> NV Bekaert SA           |          |           |         |                    |             |            |               |             |             |

*Abstract:* The invention relates to an improved non-sticking diamond-like nanocomposite composition comprising networks of a-C:H and a-Si:O wherein the H-concentration is between 85 % and 125 % of the C-concentration. The composition comprises preferably 25 to 35 at% of C, 30 to 40 at% of H, 25 to 30 at% of Si and 10 to 15 at% of O.

### Priorities

| Country                    | Case Type | Application # | Filing Date |
|----------------------------|-----------|---------------|-------------|
| European Patent Convention |           |               | 19-jun-1997 |

[Brussels #472574 v1]

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Case Number: 04752

Title: A SILICON-NITROGEN DOPED DIAMOND-LIKE CARBON COATING

Client: IC DLC TRIBOLOGICAL COATINGS

Owner: NV Bekaert SA

Disclosure Status: Filed

Disclosure Date:

Attorney(s): KH

| Country                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          | Sub Case | Case Type | Status  | Application Number | Filing Date | Pub Number | Patent Number | Issue Date  | Expiration  |
|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|----------|-----------|---------|--------------------|-------------|------------|---------------|-------------|-------------|
| Singapore                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        | PCT      |           | Granted | 200107125-7        | 16-mei-2000 |            | 84953         | 31-dec-2003 | 16-mei-2020 |
| App. Title: A SILICON-NITROGEN DOPED DIAMOND-LIKE CARBON COATING                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 |          |           |         |                    |             |            |               |             |             |
| Owner: NV Bekaert SA                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             |          |           |         |                    |             |            |               |             |             |
| Abstract: The invention relates to a silicon-nitrogen doped diamond-like carbon coating. This coating type is characterised by a low surface energy, a high hardness and a good adhesion to the substrate.<br>Such a layer functions as an excellent adhesion promoting layer for a diamond-like carbon composition coating.<br>By repeated alternation of a doped diamond-like carbon layer and a diamond-like carbon composition layer, thick coatings with a good adherence to the substrate and with low internal stresses can be deposited. |          |           |         |                    |             |            |               |             |             |

# Priorities

| Country                    | Case Type | Application # | Filing Date |
|----------------------------|-----------|---------------|-------------|
| European Patent Convention |           |               | 08-jun-1999 |

donderdag 25 februari 2010

## Master List

Page: 8

Case Number: 04788

Title: APPLICATION OF FRICTION-REDUCING DLC COATING

Client: IC DLC TRIBOLOGICAL COATINGS

Owner: BEKAERT DYMONICS

Disclosure Status: Filed

Disclosure Date:

Attorney(s): KH

| Country        | Sub Case                                                | Case Type | Status  | Application Number | Filing Date | Pub Number | Patent Number | Issue Date  | Expiration  |
|----------------|---------------------------------------------------------|-----------|---------|--------------------|-------------|------------|---------------|-------------|-------------|
| Belgium        | EPC                                                     | Granted   | Granted | 94203049.5         | 20-okt-1994 | 651069     | 651069        | 31-mrt-1999 | 20-okt-2014 |
|                | App.Title: APPLICATION OF FRICTION-REDUCING DLC COATING |           |         |                    |             |            |               |             |             |
| France         | EPC                                                     | Granted   | Granted | 94203049.5         | 20-okt-1994 | 651069     | 651069        | 31-mrt-1999 | 20-okt-2014 |
|                | App.Title: APPLICATION OF FRICTION-REDUCING DLC COATING |           |         |                    |             |            |               |             |             |
| Germany        | EPC                                                     | Granted   | Granted | 94203049.5         | 20-okt-1994 | 651069     | 69417508.0    | 31-mrt-1999 | 20-okt-2014 |
|                | App.Title: APPLICATION OF FRICTION-REDUCING DLC COATING |           |         |                    |             |            |               |             |             |
| Italy          | EPC                                                     | Granted   | Granted | 94203049.5         | 20-okt-1994 | 651069     | 651069        | 31-mrt-1999 | 20-okt-2014 |
|                | App.Title: APPLICATION OF FRICTION-REDUCING DLC COATING |           |         |                    |             |            |               |             |             |
| Luxembourg     | EPC                                                     | Granted   | Granted | 94203049.5         | 20-okt-1994 | 651069     | 651069        | 31-mrt-1999 | 20-okt-2014 |
|                | App.Title: APPLICATION OF FRICTION-REDUCING DLC COATING |           |         |                    |             |            |               |             |             |
| Netherlands    | EPC                                                     | Granted   | Granted | 94203049.5         | 20-okt-1994 | 651069     | 651069        | 31-mrt-1999 | 20-okt-2014 |
|                | App.Title: APPLICATION OF FRICTION-REDUCING DLC COATING |           |         |                    |             |            |               |             |             |
| United Kingdom | EPC                                                     | Granted   | Granted | 94203049.5         | 20-okt-1994 | 651069     | 651069        | 31-mrt-1999 | 20-okt-2014 |
|                | App.Title: APPLICATION OF FRICTION-REDUCING DLC COATING |           |         |                    |             |            |               |             |             |

**Abstract:** Method for applying a friction-reducing coating providing protection against wear on a substrate, according to which method at least one intrinsic diamond-like carbon coating is deposited directly or by means of an intermediate layer on the substrate by means of a thin-film technique, characterized in that at least one time successively an intrinsic diamond-like carbon coating and on top and in immediate contact of it a silicon alloyed diamond-like carbon coating (a-Si1-xCx:H) are deposited by means of a thin-film technique-on the substrate or on an intermediate layer of silicon deposited on the substrate.

[Brussels #472574 v1]

donderdag 25 februari 2010

Country  
Case Number: 04788 Belgium  
Country

Case Type Status

Priorities

Case Type Application #

Application Number

Filing Date

Filing Date  
29-okt-1993  
Pub Number

Patent Number

Issue Date

Expiration

donderdag 25 februari 2010

## Master List

Page: 10

Case Number: 04797

Title: METHOD FOR APPLYING A DIAMOND-LIKE CARBON COATING ON STEEL, IRON OR ALLOYS THEREOF

Client: IC DLC TRIBOLOGICAL COATINGS

Owner: BEKAERT DYMONICS

Disclosure Status: Filed

Disclosure Date:

Attorney(s): KH

| Country        | Sub Case                                                                                      | Case Type | Status | Application Number | Filing Date | Pub Number | Patent Number | Issue Date  | Expiration  |
|----------------|-----------------------------------------------------------------------------------------------|-----------|--------|--------------------|-------------|------------|---------------|-------------|-------------|
| Belgium        | EPC                                                                                           | Granted   |        | 93203248.5         | 19-nov-1993 |            | 600533        | 12-jun-1996 | 19-nov-2013 |
|                | App.Title: METHOD FOR APPLYING A DIAMOND-LIKE CARBON COATING ON STEEL, IRON OR ALLOYS THEREOF |           |        |                    |             |            |               |             |             |
|                | Owner: BEKAERT DYMONICS                                                                       |           |        |                    |             |            |               |             |             |
| France         | EPC                                                                                           | Granted   |        | 93203248.5         | 19-nov-1993 |            | 600533        | 12-jun-1996 | 19-nov-2013 |
|                | App.Title: METHOD FOR APPLYING A DIAMOND-LIKE CARBON COATING ON STEEL, IRON OR ALLOYS THEREOF |           |        |                    |             |            |               |             |             |
|                | Owner: BEKAERT DYMONICS                                                                       |           |        |                    |             |            |               |             |             |
| Germany        | EPC                                                                                           | Granted   |        | 93203248.5         | 19-nov-1993 | 600533     | 69303148.4    | 12-jun-1996 | 19-nov-2013 |
|                | App.Title: METHOD FOR APPLYING A DIAMOND-LIKE CARBON COATING ON STEEL, IRON OR ALLOYS THEREOF |           |        |                    |             |            |               |             |             |
|                | Owner: BEKAERT DYMONICS                                                                       |           |        |                    |             |            |               |             |             |
| Italy          | EPC                                                                                           | Granted   |        | 93203248.5         | 19-nov-1993 |            | 600533        | 12-jun-1996 | 19-nov-2013 |
|                | App.Title: METHOD FOR APPLYING A DIAMOND-LIKE CARBON COATING ON STEEL, IRON OR ALLOYS THEREOF |           |        |                    |             |            |               |             |             |
|                | Owner: BEKAERT DYMONICS                                                                       |           |        |                    |             |            |               |             |             |
| Luxembourg     | EPC                                                                                           | Granted   |        | 93203248.5         | 19-nov-1993 |            | 600533        | 12-jun-1996 | 19-nov-2013 |
|                | App.Title: METHOD FOR APPLYING A DIAMOND-LIKE CARBON COATING ON STEEL, IRON OR ALLOYS THEREOF |           |        |                    |             |            |               |             |             |
|                | Owner: BEKAERT DYMONICS                                                                       |           |        |                    |             |            |               |             |             |
| Netherlands    | EPC                                                                                           | Granted   |        | 93203248.5         | 19-nov-1993 |            | 600533        | 12-jun-1996 | 19-nov-2013 |
|                | App.Title: METHOD FOR APPLYING A DIAMOND-LIKE CARBON COATING ON STEEL, IRON OR ALLOYS THEREOF |           |        |                    |             |            |               |             |             |
|                | Owner: BEKAERT DYMONICS                                                                       |           |        |                    |             |            |               |             |             |
| United Kingdom | EPC                                                                                           | Granted   |        | 93203248.5         | 19-nov-1993 |            | 600533        | 12-jun-1996 | 19-nov-2013 |
|                | App.Title: METHOD FOR APPLYING A DIAMOND-LIKE CARBON COATING ON STEEL, IRON OR ALLOYS THEREOF |           |        |                    |             |            |               |             |             |
|                | Owner: BEKAERT DYMONICS                                                                       |           |        |                    |             |            |               |             |             |

**Abstract:** Method for applying an amorphous diamond-like carbon coating, which optionally may comprise up to maximum of 50 atomic % of metallic or non-metallic elements, on steel, iron or alloys thereof by means of a thin-film technique at a temperature lower than 350°C, characterized in that, before the carbon coating is applied, first an intermediate silicon film is applied on the steel, the iron or the alloy thereof by means of thin-film technique at a temperature lower than 350°C and a gradual a-Si1-xCxH transition coating is formed thereon by means of thin-film technique at a temperature lower than 350°C.

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|                                |               |          |            |            |           |                    |
|--------------------------------|---------------|----------|------------|------------|-----------|--------------------|
| Case Number: <u>Priorities</u> |               | 04797    |            |            |           |                    |
| Country                        | Country       | Sub Case | Case Type  | Status     | Case Type | Application Number |
| Number                         | Patent Number | Number   | Issue Date | Expiration |           | Application #      |
|                                | Belgium       |          |            |            |           | 02-dec-1992        |

Filing Date

Filing DatePub

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## Master List

Page: 12

Case Number: 05298

Title: ELECTRICALLY TUNABLE DLN COATINGS

Client: IC DLC TRIBOLOGICAL COATINGS

Owner: NV Bekaert SA

Disclosure Status: Filed

Disclosure Date:

Attorney(s): KH

| Country                  | Sub Case                                      | Case Type | Status  | Application Number | Filing Date | Pub Number | Patent Number | Issue Date  | Expiration  |
|--------------------------|-----------------------------------------------|-----------|---------|--------------------|-------------|------------|---------------|-------------|-------------|
| Singapore                |                                               | PCT       | Granted | 9706081-8          | 05-jun-1996 |            | 53305         | 20-feb-2001 | 05-jun-2016 |
|                          | App. Title: ELECTRICALLY TUNABLE DLN COATINGS |           |         |                    |             |            |               |             |             |
| United States of America |                                               | CIP       | Granted | 08/483848          | 07-jun-1995 |            | 5786068       | 28-jul-1998 | 28-jul-2015 |
|                          | App. Title: ELECTRICALLY TUNABLE DLN COATINGS |           |         |                    |             |            |               |             |             |
|                          | Owner: NV Bekaert SA                          |           |         |                    |             |            |               |             |             |

**Abstract:** An electrically tunable coating and method for its fabrication and deposition comprising, as a coating on a substrate, a diamond-like nanocomposite solid state material having interpenetrating atomic scale networks of carbon in a diamond-like carbon network stabilized by hydrogen, a glass-like silicon network stabilized by oxygen, and optionally at least one additional network of dopant elements or dopant compounds having elements from groups 1-7b and 8 of the periodic table. The electrical resistivity can be

### Priorities

| Country                  | Case Type | Application # | Filing Date |
|--------------------------|-----------|---------------|-------------|
| United States of America |           |               | 05-jun-1995 |
|                          |           |               | 07-jun-1995 |

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4.

Case Number: 05299

Title: DIAMOND-LIKE NANOCOMPOSITE CORROSION RESISTANT COATINGS

Client: IC DLC TRIBOLOGICAL COATINGS

Owner: NV Bekaert SA

Disclosure Status: Filed

Disclosure Date:

Attorney(s): MM

| Country                  | Sub Case                                                           | Case Type | Status  | Application Number | Filing Date | Pub Number | Patent Number | Issue Date  | Expiration  |
|--------------------------|--------------------------------------------------------------------|-----------|---------|--------------------|-------------|------------|---------------|-------------|-------------|
| India                    | ORD                                                                | Granted   |         | 984/MAS/96         | 06-jun-1996 |            | 218943        | 16-apr-2008 | 06-jun-2016 |
|                          | App.Title: DIAMOND-LIKE NANOCOMPOSITE CORROSION RESISTANT COATINGS |           |         |                    |             |            |               |             |             |
|                          | Owner: NV Bekaert SA                                               |           |         |                    |             |            |               |             |             |
| India                    | D                                                                  | DIV       | Pending | 1163/CHE/2004      | 06-jun-1996 |            |               |             |             |
|                          | App.Title: DIAMOND-LIKE NANOCOMPOSITE CORROSION RESISTANT COATINGS |           |         |                    |             |            |               |             |             |
|                          | Owner: NV Bekaert SA                                               |           |         |                    |             |            |               |             |             |
| United States of America | CIP                                                                | Granted   |         | 08/472552          | 07-jun-1995 |            | 5728465       | 17-mrt-1998 | 07-jun-2015 |
|                          | App.Title: DIAMOND-LIKE NANOCOMPOSITE CORROSION RESISTANT COATINGS |           |         |                    |             |            |               |             |             |
|                          | Owner: NV Bekaert SA                                               |           |         |                    |             |            |               |             |             |

**Abstract:** A method for inhibiting the corrosion of a substrate by applying to a substrate a corrosion resistant coating comprising a diamond-like solid state material having interpenetrating atomic scale networks of class of diamond-like solid state materials formed from interpenetrating networks comprising a first network of carbon in a diamond-like carbon network stabilized by hydrogen, a silicon network stabilized by oxygen, and optionally at least one network made from dopant elements or dopant compounds containing elements from groups 1-7b and 8 of the periodic table.

Priorities

| Country                  | Case Type | Application # | Filing Date |
|--------------------------|-----------|---------------|-------------|
| United States of America |           |               | 07-jun-1995 |

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Page: 14

Case Number: 05300

Title: EROSION RESISTANT DIAMOND-LIKE NANOCOMPOSITE COATINGS FOR OPTICAL COMPONENTS

Client: IC DLC TRIBOLOGICAL COATINGS

Owner: NV Bekaert SA

Disclosure Status: Filed

Disclosure Date:

Attorney(s): MM

| Country                                                                                  | Sub Case | Case Type | Status  | Application Number | Filing Date | Pub Number | Patent Number | Issue Date  | Expiration  |
|------------------------------------------------------------------------------------------|----------|-----------|---------|--------------------|-------------|------------|---------------|-------------|-------------|
| India                                                                                    | ORD      | Granted   |         | 985/MAS/96         | 06-jun-1996 |            | 218944        | 16-apr-2008 | 06-jun-2016 |
| App. Title: EROSION RESISTANT DIAMOND-LIKE NANOCOMPOSITE COATINGS FOR OPTICAL COMPONENTS |          |           |         |                    |             |            |               |             |             |
| Owner: NV Bekaert SA                                                                     |          |           |         |                    |             |            |               |             |             |
| India                                                                                    | D        | DIV       | Pending | 1164/CHE/2004      | 06-jun-1996 |            |               |             |             |
| App. Title: EROSION RESISTANT DIAMOND-LIKE NANOCOMPOSITE COATINGS FOR OPTICAL COMPONENTS |          |           |         |                    |             |            |               |             |             |
| Owner: NV Bekaert SA                                                                     |          |           |         |                    |             |            |               |             |             |
| United States of America                                                                 | CIP      | Granted   |         | 08/476660          | 07-jun-1995 |            | 5718976       | 17-feb-1998 |             |
| App. Title: EROSION RESISTANT DIAMOND-LIKE NANOCOMPOSITE COATINGS FOR OPTICAL COMPONENTS |          |           |         |                    |             |            |               |             |             |
| Owner: NV Bekaert SA                                                                     |          |           |         |                    |             |            |               |             |             |

Abstract: An erosion resistant coating for optically transmissive substrates formed from a diamond-like nanocomposite structure which contains interpenetrating networks of a diamond-like carbon matrix stabilized by hydrogen, a silicon glass like network stabilized by oxygen, and optionally, at least one network formed from elements and compounds from groups 1-7b and 8 of the periodic table.

### Priorities

| Country                  | Case Type | Application # | Filing Date |
|--------------------------|-----------|---------------|-------------|
| United States of America |           |               | 07-jun-1995 |

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Page: 15

Case Number: 05301

Title: CAPACITIVE THIN FILMS USING DLN MATERIALS

Client: IC DLC TRIBOLOGICAL COATINGS

Owner: NV Bekaert SA

Disclosure Status: Filed

Disclosure Date:

Attorney(s): KH

| Country                                               | Sub Case | Case Type | Status | Application Number | Filing Date | Pub Number | Patent Number | Issue Date  | Expiration  |
|-------------------------------------------------------|----------|-----------|--------|--------------------|-------------|------------|---------------|-------------|-------------|
| Australia                                             | PCT      | Granted   |        | 75132/96           | 25-sep-1996 |            | 700713        | 29-apr-1999 | 25-sep-2016 |
| App. Title: CAPACITIVE THIN FILMS USING DLN MATERIALS |          |           |        |                    |             |            |               |             |             |
| Belgium                                               | EPP      | Granted   |        | 96937640.9         | 25-sep-1996 | 1008157    | 1008157       | 20-apr-2005 | 25-sep-2016 |
| Owner: NV Bekaert SA                                  |          |           |        |                    |             |            |               |             |             |
| China (People's Republic)                             | PCT      | Granted   |        | 96198464.3         | 25-sep-1996 | 1202978    | ZL96198464.3  | 18-jun-2003 | 25-sep-2016 |
| App. Title: CAPACITIVE THIN FILMS USING DLN MATERIALS |          |           |        |                    |             |            |               |             |             |
| France                                                | EPP      | Granted   |        | 96937640.9         | 25-sep-1996 | 1008157    | 1008157       | 20-apr-2005 | 25-sep-2016 |
| Owner: NV Bekaert SA                                  |          |           |        |                    |             |            |               |             |             |
| Germany                                               | EPP      | Granted   |        | 96937640.9         | 25-sep-1996 | 1008157    | 69634641.9-08 | 20-apr-2005 | 25-sep-2016 |
| Owner: NV Bekaert SA                                  |          |           |        |                    |             |            |               |             |             |
| India                                                 | ORD      | Granted   |        | 538/MAS/97         | 14-mrt-1997 |            | 206500        | 27-apr-2007 | 14-mrt-2017 |
| App. Title: CAPACITIVE THIN FILMS USING DLN MATERIALS |          |           |        |                    |             |            |               |             |             |
| Japan                                                 | PCT      | Granted   |        | 514314/1997        | 25-sep-1996 |            | 3961025       | 25-mei-2007 | 25-sep-2016 |
| Owner: NV Bekaert SA                                  |          |           |        |                    |             |            |               |             |             |
| Korea, Republic of                                    | PCT      | Granted   |        | 10-1998-702428     | 25-sep-1996 | 1999-63955 | 10-0449603    | 10-sep-2004 | 25-sep-2016 |
| App. Title: CAPACITIVE THIN FILMS USING DLN MATERIALS |          |           |        |                    |             |            |               |             |             |
| Owner: NV Bekaert SA                                  |          |           |        |                    |             |            |               |             |             |

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Case Number: 05301

| Country                                                      | Sub Case | Case Type | Status | Application Number | Filing Date | Pub Number | Patent Number | Issue Date  | Expiration  |
|--------------------------------------------------------------|----------|-----------|--------|--------------------|-------------|------------|---------------|-------------|-------------|
| Mexico                                                       | PCT      | Granted   |        | 982581             | 25-sep-1996 |            | 201248        | 06-apr-2001 | 25-sep-2016 |
| <i>App. Title:</i> CAPACITIVE THIN FILMS USING DLN MATERIALS |          |           |        |                    |             |            |               |             |             |
| <i>Owner:</i> NV Bekaert SA                                  |          |           |        |                    |             |            |               |             |             |
| Singapore                                                    | PCT      | Granted   |        | 9802330-2          | 25-sep-1996 |            | 51898         | 21-dec-1999 | 25-sep-2016 |
| <i>App. Title:</i> CAPACITIVE THIN FILMS USING DLN MATERIALS |          |           |        |                    |             |            |               |             |             |
| <i>Owner:</i> NV Bekaert SA                                  |          |           |        |                    |             |            |               |             |             |
| Taiwan                                                       | ORD      | Granted   |        | 86104157           | 01-apr-1997 | 355803     | NI-103145     | 11-apr-1999 | 31-mrt-2017 |
| <i>App. Title:</i> CAPACITIVE THIN FILMS USING DLN MATERIALS |          |           |        |                    |             |            |               |             |             |
| <i>Owner:</i> NV Bekaert SA                                  |          |           |        |                    |             |            |               |             |             |
| United Kingdom                                               | EPP      | Granted   |        | 96937640.9         | 25-sep-1996 | 1008157    | 1008157       | 20-apr-2005 | 25-sep-2016 |
| <i>App. Title:</i> CAPACITIVE THIN FILMS USING DLN MATERIALS |          |           |        |                    |             |            |               |             |             |
| <i>Owner:</i> NV Bekaert SA                                  |          |           |        |                    |             |            |               |             |             |
| United States of America                                     | ORD      | Granted   |        | 08/538475          | 03-okt-1995 |            | 5638251       | 10-jun-1997 | 03-okt-2015 |
| <i>App. Title:</i> CAPACITIVE THIN FILMS USING DLN MATERIALS |          |           |        |                    |             |            |               |             |             |
| <i>Owner:</i> NV Bekaert SA                                  |          |           |        |                    |             |            |               |             |             |

*Abstract:* A method of making capacitors (25) comprising, providing as dielectric (27) and/or conductive layers (26), a material made from a diamond-like nanocomposite solid-state material having interpenetrating atomic scale networks of carbon in a diamond-like carbon network stabilized by hydrogen, a glass-like silicon network stabilized by oxygen, and optionally at least one additional network of dopant elements or dopant compounds having elements from Groups 1-7b and 8 of the periodic table.

### Priorities

| Country                  | Case Type | Application # | Filing Date |
|--------------------------|-----------|---------------|-------------|
| United States of America |           |               | 03-okt-1995 |

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Case Number: 05303

Title: ELECTRICALLY TUNABLE LOW SECONDARY ELECTRON  
EMISSION DIAMOND-LIKE COATINGS AND PROCESS FOR  
DEPOSITING COATINGS

Client: IC DLC TRIBOLOGICAL COATINGS

Owner: NV Bekaert SA

Disclosure Status: Filed

Disclosure Date:

Attorney(s): MM

| Country                                                                                                                    | Sub Case | Case Type | Status  | Application Number | Filing Date | Pub Number | Patent Number | Issue Date  | Expiration  |
|----------------------------------------------------------------------------------------------------------------------------|----------|-----------|---------|--------------------|-------------|------------|---------------|-------------|-------------|
| India                                                                                                                      | ORD      | Granted   |         | 1002/MAS/98        | 08-mei-1998 |            | 201583        | 01-aug-2006 | 08-mei-2018 |
| App. Title: ELECTRICALLY TUNABLE LOW SECONDARY ELECTRON EMISSION DIAMOND-LIKE COATINGS AND PROCESS FOR DEPOSITING COATINGS |          |           |         |                    |             |            |               |             |             |
| Owner: NV Bekaert SA                                                                                                       |          |           |         |                    |             |            |               |             |             |
| Taiwan                                                                                                                     | ORD      | Granted   |         | 87107237           | 21-mei-1998 | 398018     | NI-117572     | 11-jul-2000 | 21-mei-2018 |
| App. Title: ELECTRICALLY TUNABLE LOW SECONDARY ELECTRON EMISSION DIAMOND-LIKE COATINGS AND PROCESS FOR DEPOSITING COATINGS |          |           |         |                    |             |            |               |             |             |
| Owner: NV Bekaert SA                                                                                                       |          |           |         |                    |             |            |               |             |             |
| United States of America                                                                                                   | ORD      | Granted   |         | 08/853929          | 09-mei-1997 |            | 6013980       | 11-jan-2000 | 09-mei-2017 |
| App. Title: ELECTRICALLY TUNABLE LOW SECONDARY ELECTRON EMISSION DIAMOND-LIKE COATINGS AND PROCESS FOR DEPOSITING COATINGS |          |           |         |                    |             |            |               |             |             |
| Owner: NV Bekaert SA                                                                                                       |          |           |         |                    |             |            |               |             |             |
| United States of America                                                                                                   | D        | DIV       | Granted | 09/422630          | 21-okt-1999 |            | 6486597       | 26-nov-2002 | 09-mei-2017 |
| App. Title: ELECTRICALLY TUNABLE LOW SECONDARY ELECTRON EMISSION DIAMOND-LIKE COATINGS AND PROCESS FOR DEPOSITING COATINGS |          |           |         |                    |             |            |               |             |             |
| Owner: NV Bekaert SA                                                                                                       |          |           |         |                    |             |            |               |             |             |

Abstract: A diamond-like carbon-containing material useful as a coating for electronic devices including field emission devices and color television tubes, the coatings having both low secondary emission coefficients of less than unity and electrical resistivity tunable over a range from about 10e-2 to about 10e16.

### Priorities

| Country                  | Case Type | Application # | Filing Date |
|--------------------------|-----------|---------------|-------------|
| United States of America |           |               | 09-mei-1997 |

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Case Number: 05304

Title: HARDCOATS FOR FLAT PANEL DISPLAY

Client: IC DLC TRIBOLOGICAL COATINGS

Owner: NV Bekaert SA

Disclosure Status: Filed

Disclosure Date:

Attorney(s): KH

| Country                                      | Sub Case | Case Type | Status  | Application Number | Filing Date | Pub Number | Patent Number | Issue Date  | Expiration  |
|----------------------------------------------|----------|-----------|---------|--------------------|-------------|------------|---------------|-------------|-------------|
| Taiwan                                       | ORD      |           | Granted | 088112697          | 27-jul-1999 |            | NL-177859     | 21-mei-2003 | 27-jul-2019 |
| App. Title: HARDCOATS FOR FLAT PANEL DISPLAY |          |           |         |                    |             |            |               |             |             |
| Owner: NV Bekaert SA                         |          |           |         |                    |             |            |               |             |             |
| United States of America                     | ORD      |           | Granted | 09/361006          | 27-jul-1999 |            | 6083313       | 04-jul-2000 | 27-jul-2019 |
| App. Title: HARDCOATS FOR FLAT PANEL DISPLAY |          |           |         |                    |             |            |               |             |             |
| Owner: NV Bekaert SA                         |          |           |         |                    |             |            |               |             |             |

**Abstract:** A unique hardcoating provides the necessary characteristics for flat panel display plastic substrates because the coating is amorphous and is comprised of C, H, Si and O. The coating of the present invention is hard, optically transparent, scratch and abrasion resistant and hydrophobic. It is deposited by a low density, low temperature plasma enhanced chemical vapor deposition (PECVD) process and exhibits excellent barrier protection and reduced permeability to moisture, oxygen, helium and other vapors.

### Priorities

| Country                  | Case Type | Application # | Filing Date |
|--------------------------|-----------|---------------|-------------|
| United States of America |           |               | 27-jul-1998 |

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[Brussels #472574 v1]

Case Number: 05305

Title: DIAMOND-LIKE NANOCOMPOSITE THIN FILMS FOR  
AUTOMOTIVE POWERTRAIN COMPONENT COATINGS

Client: IC DLC TRIBOLOGICAL COATINGS

Owner: NV Bekaert SA

Disclosure Status: Filed

Disclosure Date:

Attorney(s): KH

| Country | Sub Case | Case Type | Status  | Application Number | Filing Date | Pub Number | Patent Number | Issue Date  | Expiration  |
|---------|----------|-----------|---------|--------------------|-------------|------------|---------------|-------------|-------------|
| India   | ORD      |           | Granted | 536/MAS/97         | 14-mrt-1997 |            | 208300        | 20-jul-2007 | 14-mrt-2017 |

App. Title: DIAMOND-LIKE NANOCOMPOSITE THIN FILMS FOR AUTOMOTIVE POWERTRAIN COMPONENT COATINGS

Owner: NV Bekaert SA

Abstract: A method for inhibiting wear and reducing friction of components in powertrain assembly comprising applying to said component a coating made from a class of diamond-like solid state material formed interpenetrating networks comprising a first network of diamond-like carbon stabilized by hydrogen, a silicon network stabilized by oxygen, and optionally at least one network made from dopant elements or dopant compounds containing elements from Groups 1-7b and 8.

#### Priorities

| Country                  | Case Type | Application # | Filing Date |
|--------------------------|-----------|---------------|-------------|
| United States of America |           |               | 03-okt-1995 |

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[Brussels #472574 v1]

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Page: 20

Case Number: 05309

Title: FLUORINE DOPED DIAMOND-LIKE COATINGS

Client: IC DLC TRIBOLOGICAL COATINGS

Owner: NV Bekaert SA

Disclosure Status: Filed

Disclosure Date:

Attorney(s): KH

| Country                                         | Sub Case | Case Type | Status | Application Number | Filing Date | Pub Number | Patent Number | Issue Date  | Expiration  |
|-------------------------------------------------|----------|-----------|--------|--------------------|-------------|------------|---------------|-------------|-------------|
| European Patent Convention                      | PCT      | Published |        | 98960674.4         | 03-dec-1998 | 1039990    |               |             | 03-dec-2018 |
| App.Title: FLUORINE DOPED DIAMOND-LIKE COATINGS |          |           |        |                    |             |            |               |             |             |
| Owner: NV Bekaert SA                            |          |           |        |                    |             |            |               |             |             |
| India                                           | ORD      | Granted   |        | 2720/MAS/98        | 02-dec-1998 |            | 205638        | 09-apr-2007 | 02-dec-2018 |
| App.Title: FLUORINE DOPED DIAMOND-LIKE COATINGS |          |           |        |                    |             |            |               |             |             |
| Owner: NV Bekaert SA                            |          |           |        |                    |             |            |               |             |             |
| Korea, Republic of                              | PCT      | Granted   |        | 2000-7006130       | 03-dec-1998 | 2001-32812 | 623054        | 05-sep-2006 | 03-dec-2018 |
| App.Title: FLUORINE DOPED DIAMOND-LIKE COATINGS |          |           |        |                    |             |            |               |             |             |
| Owner: NV Bekaert SA                            |          |           |        |                    |             |            |               |             |             |
| Mexico                                          | PCT      | Pending   |        |                    | 03-dec-1998 |            |               |             | 03-dec-2018 |
| App.Title: FLUORINE DOPED DIAMOND-LIKE COATINGS |          |           |        |                    |             |            |               |             |             |
| Owner: NV Bekaert SA                            |          |           |        |                    |             |            |               |             |             |
| Singapore                                       | PCT      | Granted   |        | 200002853-0        | 03-dec-1998 |            | 73346         | 14-jun-2002 | 03-dec-2018 |
| App.Title: FLUORINE DOPED DIAMOND-LIKE COATINGS |          |           |        |                    |             |            |               |             |             |
| Owner: NV Bekaert SA                            |          |           |        |                    |             |            |               |             |             |
| Taiwan                                          | ORD      | Granted   |        | 87120193           | 04-dec-1998 |            | NI-195998     | 11-feb-2004 | 04-dec-2018 |
| App.Title: FLUORINE DOPED DIAMOND-LIKE COATINGS |          |           |        |                    |             |            |               |             |             |
| Owner: NV Bekaert SA                            |          |           |        |                    |             |            |               |             |             |
| United States of America                        | CIP      | Granted   |        | 09/204441          | 02-dec-1998 |            | 6468642       | 22-okt-2002 | 03-okt-2015 |
| App.Title: FLUORINE DOPED DIAMOND-LIKE COATINGS |          |           |        |                    |             |            |               |             |             |
| Owner: NV Bekaert SA                            |          |           |        |                    |             |            |               |             |             |

Abstract: Fluorine-doped coatings which include a diamond-like composition containing carbon, silicon, oxygen, hydrogen, and fluorine on various substrates. Preferred substrates include flexible substrates, precision-edged substrates, and electrosurgical instruments.

### Priorities

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Case Number: 05309

Priorities

| Country                  | Case Type Application # | Filing Date |
|--------------------------|-------------------------|-------------|
| United States of America |                         | 5-dec-1997  |
|                          |                         | 02-dec-1998 |
|                          |                         | 12-feb-1998 |

donderdag 25 februari 2010

## Master List

Page: 22

Case Number: 05310

Title: CARBON BASED LOW K MATERIAL

Client: IC DLC TRIBOLOGICAL COATINGS

Owner: NV Bekaert SA

Disclosure Status: Filed

Disclosure Date:

Attorney(s): KH

| Country                                        | Sub Case | Case Type | Status  | Application Number | Filing Date | Pub Number | Patent Number | Issue Date  | Expiration  |
|------------------------------------------------|----------|-----------|---------|--------------------|-------------|------------|---------------|-------------|-------------|
| United States of America                       | PCT      |           | Granted | 10/239493          | 20-mrt-2001 |            | 6998636       | 14-feb-2006 | 20-mrt-2021 |
| <b>App. Title:</b> CARBON BASED LOW K MATERIAL |          |           |         |                    |             |            |               |             |             |
| <b>Owner:</b> NV Bekaert SA                    |          |           |         |                    |             |            |               |             |             |

**Abstract:** An integrated circuit comprising a dielectric material comprising carbon, hydrogen, silicon, and oxygen, wherein the material has a dielectric constant below 3,0. The dielectric material can be used as an IMD, as an etch stop or as a copper barrier in IC manufacturing. The coating exhibits excellent adhesion to a variety of materials, has a good thermal stability and is hydrophobic.

### Priorities

| Country                  | Case Type | Application # | Filing Date |
|--------------------------|-----------|---------------|-------------|
| United States of America |           |               | 20-mrt-2000 |

[Brussels #472574 v1]

23

Case Number: 05409

Title: METAL DOPED DLN FOR COPPER BARRIER APPLICATIONS

Client: IC DLC TRIBOLOGICAL COATINGS

Owner: NV Bekaert SA

Disclosure Status: Filed

Disclosure Date:

Attorney(s): MM

| Country                                                     | Sub Case | Case Type | Status | Application Number | Filing Date | Pub Number | Patent Number | Issue Date  | Expiration  |
|-------------------------------------------------------------|----------|-----------|--------|--------------------|-------------|------------|---------------|-------------|-------------|
| United States of America                                    | PCT      | Granted   |        | 10/466948          | 22-jan-2002 |            | 7019399       | 28-mrt-2006 | 22-jan-2022 |
| App. Title: METAL DOPED DLN FOR COPPER BARRIER APPLICATIONS |          |           |        |                    |             |            |               |             |             |
| Owner: NV Bekaert SA                                        |          |           |        |                    |             |            |               |             |             |

Abstract: Application of metal and carbon based composite coatings as barriers against Copper diffusion.

As general background, in IC-technology, Al is more and more replaced by Cu in order to decrease the resistivity and SiO<sub>2</sub> is more and more replaced by Low K material in order to decrease the dielectric coefficient. In order to have this combination worked, a barrier is needed between the Cu and the Low K material. This can be done by DLN coatings, which consist of C, H, Si and O. The coatings have metal dopant levels up to 90 % of the overall composition. A variety of metal dopant materials, including such metals as Ti, Ta and W have been demonstrated to be effective barriers. The incorporation of the metal dopant into the coating using a metal-organic precursor in a chemical vapor deposition (MOCVD) or using a physical vapor deposition technique (PVD) is envisaged. The coating may be amorphous, highly conformal, have high electrical conductivity, have high thermal stability, have the capability of direct Cu plating (no seeding layer required) and to be a suitable barrier against Cu diffusion. This invention also pertains to the combination of undoped Dylyn coatings as a low k dielectric material and metal and carbon based composite coatings in a gradient coating which results in a zero barrier thickness diffusion layer.

Priorities

| Country                  | Case Type | Application # | Filing Date |
|--------------------------|-----------|---------------|-------------|
| United States of America |           |               | 22-jan-2001 |

donderdag 25 februari 2010

## Master List

Page: 24

Case Number: 06376

Title: STACK WITH IMPROVED ADHESION FOR HARD DIAMOND COATING

Client: IC DLC TRIBOLOGICAL COATINGS

Owner: NV Bekaert SA

Disclosure Status: Filed

Disclosure Date:

Attorney(s): KH

| Country                                                           | Sub Case | Case Type | Status | Application Number | Filing Date | Pub Number   | Patent Number     | Issue Date  | Expiration  |
|-------------------------------------------------------------------|----------|-----------|--------|--------------------|-------------|--------------|-------------------|-------------|-------------|
| Belgium                                                           | EPP      | Granted   |        | 04766109.5         | 01-jul-2004 | 1651796      | 1651796           | 03-jan-2007 | 01-jul-2024 |
| App. Title: STACK WITH IMPROVED ADHESION FOR HARD DIAMOND COATING |          |           |        |                    |             |              |                   |             |             |
| China (People's Republic)                                         | PCT      | Granted   |        | 200480019190.6     | 01-jul-2004 | 1816648A     | ZL200480019190.6  | 05-aug-2009 | 01-jul-2024 |
| Owner: NV Bekaert SA                                              |          |           |        |                    |             |              |                   |             |             |
| France                                                            | EPP      | Granted   |        | 04766109.5         | 01-jul-2004 | 1651796      | 1651796           | 03-jan-2007 | 01-jul-2024 |
| App. Title: STACK WITH IMPROVED ADHESION FOR HARD DIAMOND COATING |          |           |        |                    |             |              |                   |             |             |
| Owner: NV Bekaert SA                                              |          |           |        |                    |             |              |                   |             |             |
| Germany                                                           | EPP      | Granted   |        | 04766109.5         | 01-jul-2004 | 1651796      | 602004004150.5-08 | 03-jan-2007 | 01-jul-2024 |
| App. Title: STACK WITH IMPROVED ADHESION FOR HARD DIAMOND COATING |          |           |        |                    |             |              |                   |             |             |
| Owner: NV Bekaert SA                                              |          |           |        |                    |             |              |                   |             |             |
| Italy                                                             | EPP      | Granted   |        | 04766109.5         | 01-jul-2004 | 1651796      | 1651796           | 03-jan-2007 | 01-jul-2024 |
| App. Title: STACK WITH IMPROVED ADHESION FOR HARD DIAMOND COATING |          |           |        |                    |             |              |                   |             |             |
| Owner: NV Bekaert SA                                              |          |           |        |                    |             |              |                   |             |             |
| United Kingdom                                                    | EPP      | Granted   |        | 04766109.5         | 01-jul-2004 | 1651796      | 1651796           | 03-jan-2007 | 01-jul-2024 |
| App. Title: STACK WITH IMPROVED ADHESION FOR HARD DIAMOND COATING |          |           |        |                    |             |              |                   |             |             |
| Owner: NV Bekaert SA                                              |          |           |        |                    |             |              |                   |             |             |
| United States of America                                          | PCT      | Published |        | 10/565265          | 01-jul-2004 | 2006/0182895 |                   |             | 01-jul-2024 |
| App. Title: STACK WITH IMPROVED ADHESION FOR HARD DIAMOND COATING |          |           |        |                    |             |              |                   |             |             |
| Owner: NV Bekaert SA                                              |          |           |        |                    |             |              |                   |             |             |

Abstract: The invention relates to a substrate covered at least partially with a layered coating. The layered coating comprises an intermediate coating and a hard carbon coating. The intermediate coating comprises

- a first metal layer deposited on the substrate, the first metal layer comprising Ti or Cr;
- a nitride layer deposited on the first metal layer, the nitride layer comprising TiN or CrN;
- a second metal layer deposited on the nitride layer, the second metal layer comprising Ti or Cr;
- a transition layer deposited on the second metal layer, the transition layer comprising TixCy or CrxCy.

donderdag 25 februari 2010

Case Number: 06376

Country  
Issue Date

Priorities  
Expiration

Country  
European Patent Convention

Case Type

Status

Case Type Application #

Application Number

Filing Date  
25-jul-2003

Filing Date

Pub Number

Patent Number

## Master List

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[Brussels #472574 v1]

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## Master List

Page: 26

Case Number: 06642

Title: A LAYERED STRUCTURE WITH IMPROVED ADHESION :  
Ti/CR-DLN-DLC

Client: IC DLC TRIBOLOGICAL COATINGS

Owner: NV Bekaert SA

Disclosure Status: Filed

Disclosure Date:

Attorney(s): KH

| Country                    | Sub Case                                                              | Case Type | Status | Application Number | Filing Date | Pub Number    | Patent Number | Issue Date  | Expiration  |
|----------------------------|-----------------------------------------------------------------------|-----------|--------|--------------------|-------------|---------------|---------------|-------------|-------------|
| Australia                  | PCT                                                                   | Granted   |        | 2004293440         | 30-nov-2004 |               | 2004293440    | 11-feb-2010 | 30-nov-2024 |
|                            | App.Title: A LAYERED STRUCTURE WITH IMPROVED ADHESION : Ti/CR-DLN-DLC |           |        |                    |             |               |               |             |             |
|                            | Owner: NV Bekaert SA                                                  |           |        |                    |             |               |               |             |             |
| Brazil                     | PCT                                                                   | Published |        | 0417226-4          | 30-nov-2004 | 1887          |               |             | 02-dec-2023 |
|                            | App.Title: A LAYERED STRUCTURE WITH IMPROVED ADHESION : Ti/CR-DLN-DLC |           |        |                    |             |               |               |             |             |
|                            | Owner: NV Bekaert SA                                                  |           |        |                    |             |               |               |             |             |
| China (People's Republic)  | PCT                                                                   | Published |        | 200480035764.9     | 30-nov-2004 | CN1890398A    |               |             | 30-nov-2024 |
|                            | App.Title: A LAYERED STRUCTURE WITH IMPROVED ADHESION : Ti/CR-DLN-DLC |           |        |                    |             |               |               |             |             |
|                            | Owner: NV Bekaert SA                                                  |           |        |                    |             |               |               |             |             |
| European Patent Convention | PCT                                                                   | Published |        | 04819646.3         | 30-nov-2004 | 1704264       |               |             | 30-nov-2024 |
|                            | App.Title: A LAYERED STRUCTURE WITH IMPROVED ADHESION : Ti/CR-DLN-DLC |           |        |                    |             |               |               |             |             |
|                            | Owner: NV Bekaert SA                                                  |           |        |                    |             |               |               |             |             |
| India                      | PCT                                                                   | Pending   |        | 2861/DELNP/2006    | 30-nov-2004 |               |               |             | 30-nov-2024 |
|                            | App.Title: A LAYERED STRUCTURE WITH IMPROVED ADHESION : Ti/CR-DLN-DLC |           |        |                    |             |               |               |             |             |
|                            | Owner: NV Bekaert SA                                                  |           |        |                    |             |               |               |             |             |
| Japan                      | PCT                                                                   | Published |        | 2006-541890        | 30-nov-2004 | 2007-513856   |               |             | 30-nov-2024 |
|                            | App.Title: A LAYERED STRUCTURE WITH IMPROVED ADHESION : Ti/CR-DLN-DLC |           |        |                    |             |               |               |             |             |
|                            | Owner: NV Bekaert SA                                                  |           |        |                    |             |               |               |             |             |
| United States of America   | PCT                                                                   | Published |        | 10/581188          | 30-nov-2004 | US2008/016628 |               |             | 30-nov-2024 |
|                            | App.Title: A LAYERED STRUCTURE WITH IMPROVED ADHESION : Ti/CR-DLN-DLC |           |        |                    |             |               |               |             |             |
|                            | Owner: NV Bekaert SA                                                  |           |        |                    |             |               |               |             |             |

Abstract: The invention relates to a layered structure comprising

- a first intermediate layer, said first intermediate layer comprising at least one element of group IVB, group VB or group VIB (examples : Ti or Cr)
- a second intermediate layer deposited on top of said first intermediate layer, said second intermediate layer comprising a diamond-like nanocomposite composition;
- a diamond-like carbon layer deposited on top of said second intermediate layer.

The invention further relates to the use of a substrate coated with such a layered structure for high shear and/or high impact applications and to a method to cover a substrate with such a layered structure.

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[Brussels #472574 v1]

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Case Number: 06642

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| Country<br>Issue Date | Priorities<br>Expiration | Sub Case                  | Case Type | Status    | Case Type     | Application Number | Filing Date | Pub Number | Patent Number |
|-----------------------|--------------------------|---------------------------|-----------|-----------|---------------|--------------------|-------------|------------|---------------|
|                       | Country                  | Patent Cooperation Treaty |           | Case Type | Application # |                    | Filing Date |            |               |
|                       |                          |                           |           |           |               | 02-dec-2003        |             |            |               |

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[Brussels #472574 v1]

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## Master List

Page: 28

Case Number: 07341

Title: COATING COMPRISING LAYERED STRUCTURES OF DIAMOND LIKE NANOCOMPOSITE LAYERS AND DIAMOND LIKE CARBON LAYERS.

Client: IC DLC TRIBOLOGICAL COATINGS

Owner: NV Bekaert SA

Disclosure Status: Filed

Disclosure Date:

Attorney(s): KH

| Country                                                                                                                | Sub Case | Case Type | Status | Application Number | Filing Date | Pub Number    | Patent Number | Issue Date | Expiration  |
|------------------------------------------------------------------------------------------------------------------------|----------|-----------|--------|--------------------|-------------|---------------|---------------|------------|-------------|
| European Patent Convention                                                                                             | PCT      | Published |        | 06753817.3         | 24-mei-2006 | 1885908       |               |            | 24-mei-2026 |
| App. Title: COATING COMPRISING LAYERED STRUCTURES OF DIAMOND LIKE NANOCOMPOSITE LAYERS AND DIAMOND LIKE CARBON LAYERS. |          |           |        |                    |             |               |               |            |             |
| United States of America                                                                                               | PCT      | Published |        | 11/915242          | 24-mei-2006 | US2008/019364 |               |            | 24-mei-2026 |
| App. Title: COATING COMPRISING LAYERED STRUCTURES OF DIAMOND LIKE NANOCOMPOSITE LAYERS AND DIAMOND LIKE CARBON LAYERS. |          |           |        |                    |             |               |               |            |             |
| Owner: NV Bekaert SA                                                                                                   |          |           |        |                    |             |               |               |            |             |

Abstract: The invention relates to a coating comprising a number of layered structures, each such layered structure comprising

-a first layer comprising a diamond like nanocomposite layer, said first layer comprising carbon, hydrogen, oxygen and silicon;

-a second layer comprising a diamond like carbon layer.

The number of layered structure is higher than 4 and is preferably between 10 and 100.

The invention further relates to a method to deposit such a coating.

### Priorities

| Country                    | Case Type | Application # | Filing Date |
|----------------------------|-----------|---------------|-------------|
| European Patent Convention | PRI       | 05104514.4    | 26-mei-2005 |

[Brussels #472574 v1]

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Case Number: 07437

Title: SUBSTRATE COATED WITH A LAYERED STRUCTURE  
COMPRISING A TETRAHEDRAL CARBON COATING

Client: IC DLC TRIBOLOGICAL COATINGS

Owner: NV Bekaert SA

Disclosure Status: Filed

Disclosure Date:

Attorney(s): KH

| Country                                                                                       | Sub Case | Case Type | Status    | Application Number | Filing Date | Pub Number   | Patent Number | Issue Date | Expiration  |
|-----------------------------------------------------------------------------------------------|----------|-----------|-----------|--------------------|-------------|--------------|---------------|------------|-------------|
| China (People's Republic)                                                                     | PCT      | Published | Published | 200680029967.6     | 13-jul-2006 | CN101365824  |               |            | 13-jul-2026 |
| App. Title: SUBSTRATE COATED WITH A LAYERED STRUCTURE COMPRISING A TETRAHEDRAL CARBON COATING |          |           |           |                    |             |              |               |            |             |
| European Patent Convention                                                                    | PCT      | Published | Published | 06777754.0         | 13-jul-2006 | 1937873      |               |            | 13-jul-2026 |
| Owner: NV Bekaert SA                                                                          |          |           |           |                    |             |              |               |            |             |
| App. Title: SUBSTRATE COATED WITH A LAYERED STRUCTURE COMPRISING A TETRAHEDRAL CARBON COATING |          |           |           |                    |             |              |               |            |             |
| Japan                                                                                         | PCT      | Published | Published | 2008-526466        | 13-jul-2006 | 2009-504919  |               |            | 13-jul-2026 |
| Owner: NV Bekaert SA                                                                          |          |           |           |                    |             |              |               |            |             |
| App. Title: SUBSTRATE COATED WITH A LAYERED STRUCTURE COMPRISING A TETRAHEDRAL CARBON COATING |          |           |           |                    |             |              |               |            |             |
| United States of America                                                                      | PCT      | Published | Published | 12/063927          | 13-jul-2006 | 2008-0233425 |               |            | 13-jul-2026 |
| Owner: NV Bekaert SA                                                                          |          |           |           |                    |             |              |               |            |             |

**Abstract:** The invention relates to a substrate coated at least partially with a layered structure. The layered structure comprises an intermediate layer deposited on said substrate and a tetrahedral carbon layer deposited on said intermediate layer.  
The intermediate layer comprises at least one amorphous carbon layer having a Young's modulus lower than 200 GPa and the tetrahedral carbon layer has a Young's modulus higher than 200 GPa.

The invention further relates to a method to improve the adhesion of a tetrahedral carbon layer to a substrate and to a method to bridge the gap in Young's modulus of the substrate and the Young's modulus of a tetrahedral carbon coating deposited on said substrate.

Priorities

| Country                    | Case Type | Application # | Filing Date |
|----------------------------|-----------|---------------|-------------|
| European Patent Convention | PRI       | 05107583.6    | 18-aug-2005 |

[Brussels #472574 v1]

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## Master List

Page: 30

Case Number: 07463

Title: A MIXED MODE PVD-CVD COATING APPARATUS

Client: IC DLC TRIBOLOGICAL COATINGS

Owner: NV Bekaert SA

Disclosure Status: Filed

Disclosure Date:

Attorney(s): GS

| Country                                           | Sub Case | Case Type | Status | Application Number | Filing Date | Pub Number      | Patent Number | Issue Date | Expiration  |
|---------------------------------------------------|----------|-----------|--------|--------------------|-------------|-----------------|---------------|------------|-------------|
| China (People's Republic)                         | PCT      | Published |        | 200780011589.3     | 14-mrt-2007 | CN101410546A    |               |            | 14-mrt-2027 |
| App.Title: A MIXED MODE PVD-CVD COATING APPARATUS |          |           |        |                    |             |                 |               |            |             |
| Owner: NV Bekaert SA                              |          |           |        |                    |             |                 |               |            |             |
| European Patent Convention                        | PCT      | Published |        | 07712520.1         | 14-mrt-2007 | 1999292         |               |            | 14-mrt-2027 |
| App.Title: A MIXED MODE PVD-CVD COATING APPARATUS |          |           |        |                    |             |                 |               |            |             |
| Owner: NV Bekaert SA                              |          |           |        |                    |             |                 |               |            |             |
| Japan                                             | PCT      | Published |        | 2009-502005        | 14-mrt-2007 | 2009-531544     |               |            | 14-mrt-2027 |
| App.Title: A MIXED MODE PVD-CVD COATING APPARATUS |          |           |        |                    |             |                 |               |            |             |
| Owner: NV Bekaert SA                              |          |           |        |                    |             |                 |               |            |             |
| United States of America                          | PCT      | Published |        | 12/293891          | 14-mrt-2007 | US-2009-0114529 |               |            | 14-mrt-2027 |
| App.Title: A MIXED MODE PVD-CVD COATING APPARATUS |          |           |        |                    |             |                 |               |            |             |
| Owner: NV Bekaert SA                              |          |           |        |                    |             |                 |               |            |             |

**Abstract:** A coating apparatus is revealed that is designed to coat substrates by means of a physical vacuum deposition process or a chemical vacuum deposition process or a combination thereof. Said coating apparatus is particular in that it uses a rotatable magnetron that is coverable with an axially moveable shutter. Such an arrangement enables to keep the magnetron target clean or to clean the target in between or even during subsequent coating steps. The shutter further provides for a controllable gas atmosphere in the vicinity of the target. The arrangement wherein the magnetron is centrally placed is described. Substrates are then exposed to the sputtering source from all angles by hanging them on a planetary carousel that turns around the magnetron.

### Priorities

| Country                    | Case Type | Application # | Filing Date |
|----------------------------|-----------|---------------|-------------|
| European Patent Convention | PRI       | 06111843.6    | 28-mrt-2006 |

[Brussels #472574 v1]

31

Case Number: 07468

Title: PREVENTING METAL CONTAMINATION OF A COMPONENT  
IN SEMI-CONDUCTORS

Client: IC DLC TRIBOLOGICAL COATINGS

Owner: NV Bekaert SA

Disclosure Status: Filed

Disclosure Date:

Attorney(s): KH

| Country                                                                      | Sub Case | Case Type | Status | Application Number | Filing Date | Pub Number   | Patent Number | Issue Date | Expiration  |
|------------------------------------------------------------------------------|----------|-----------|--------|--------------------|-------------|--------------|---------------|------------|-------------|
| China (People's Republic)                                                    | PCT      | Published |        | 200780020392.6     | 31-mei-2007 | CN101467243A |               |            | 31-mei-2027 |
| App. Title: PREVENTING METAL CONTAMINATION OF A COMPONENT IN SEMI-CONDUCTORS |          |           |        |                    |             |              |               |            |             |
| Owner: NV Bekaert SA                                                         |          |           |        |                    |             |              |               |            |             |
| European Patent Convention                                                   | PCT      | Published |        | 07729748.9         | 31-mei-2007 | 2024994      |               |            | 31-mei-2027 |
| App. Title: PREVENTING METAL CONTAMINATION OF A COMPONENT IN SEMI-CONDUCTORS |          |           |        |                    |             |              |               |            |             |
| Owner: NV Bekaert SA                                                         |          |           |        |                    |             |              |               |            |             |
| Japan                                                                        | PCT      | Published |        | 2009-512605        | 31-mei-2007 | 2009-539240  |               |            | 31-mei-2027 |
| App. Title: PREVENTING METAL CONTAMINATION OF A COMPONENT IN SEMI-CONDUCTORS |          |           |        |                    |             |              |               |            |             |
| Owner: NV Bekaert SA                                                         |          |           |        |                    |             |              |               |            |             |
| United States of America                                                     | PCT      | Published |        | 12/302,133         | 31-mei-2007 | 2009/0142599 |               |            | 31-mei-2027 |
| App. Title: PREVENTING METAL CONTAMINATION OF A COMPONENT IN SEMI-CONDUCTORS |          |           |        |                    |             |              |               |            |             |
| Owner: NV Bekaert SA                                                         |          |           |        |                    |             |              |               |            |             |

Abstract: The invention relates to a method to avoid metal contamination of a component used to transport and/or support a semiconductor substrate.

The component used to transport and/or support a semiconductor substrate is at least partially provided with a metal free conductive carbon based coating doped with nitrogen.

The invention further relates to a component used to transport and/or support a semiconductor substrate at least partially coated with a metal free conductive carbon based

### Priorities

| Country                    | Case Type | Application # | Filing Date |
|----------------------------|-----------|---------------|-------------|
| European Patent Convention | PRI       | 06114915.9    | 02-jun-2006 |

[Brussels #472574 v1]

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## Master List

Page: 32

Case Number: 07487

Title: PISTON RING HAVING HARD MULTI-LAYER COATING

Client: IC DLC TRIBOLOGICAL COATINGS

Owner: NV Bekaert SA

Disclosure Status: Filed

Disclosure Date:

Attorney(s): KH

| Country                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      | Sub Case | Case Type | Status | Application Number | Filing Date | Pub Number    | Patent Number | Issue Date | Expiration  |
|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|----------|-----------|--------|--------------------|-------------|---------------|---------------|------------|-------------|
| China (People's Republic)                                                                                                                                                                                                                                                                                                                                                                                                                                                                    | PCT      | Published |        | 200680022896.7     | 01-mrt-2006 | CN101208461A  |               |            | 01-mrt-2026 |
| App. Title: PISTON RING HAVING HARD MULTI-LAYER COATING                                                                                                                                                                                                                                                                                                                                                                                                                                      |          |           |        |                    |             |               |               |            |             |
| Owner: NV Bekaert SA                                                                                                                                                                                                                                                                                                                                                                                                                                                                         |          |           |        |                    |             |               |               |            |             |
| European Patent Convention                                                                                                                                                                                                                                                                                                                                                                                                                                                                   | PCT      | Published |        | 06708570.4         | 01-mrt-2006 | 1883717       |               |            | 01-mrt-2026 |
| App. Title: PISTON RING HAVING HARD MULTI-LAYER COATING                                                                                                                                                                                                                                                                                                                                                                                                                                      |          |           |        |                    |             |               |               |            |             |
| Owner: NV Bekaert SA                                                                                                                                                                                                                                                                                                                                                                                                                                                                         |          |           |        |                    |             |               |               |            |             |
| United States of America                                                                                                                                                                                                                                                                                                                                                                                                                                                                     | PCT      | Published |        | 11/915246          | 01-mrt-2006 | US2008/020367 |               |            | 01-mrt-2026 |
| App. Title: PISTON RING HAVING HARD MULTI-LAYER COATING                                                                                                                                                                                                                                                                                                                                                                                                                                      |          |           |        |                    |             |               |               |            |             |
| Owner: NV Bekaert SA                                                                                                                                                                                                                                                                                                                                                                                                                                                                         |          |           |        |                    |             |               |               |            |             |
| Abstract: A piston ring (22) is covered at least partially with a layered structure (30). The layered structure (30) comprises:<br>- a first intermediate layer (32) comprising at least one element of group IVB, group VB or group VIB;<br>- a second intermediate layer (34) deposited on top of the first intermediate layer (32) and comprising a diamond-like nanocomposite composition;<br>- a diamond-like carbon layer (36) deposited on top of the second intermediate layer (34). |          |           |        |                    |             |               |               |            |             |

### Priorities

| Country                    | Case Type | Application # | Filing Date |
|----------------------------|-----------|---------------|-------------|
| European Patent Convention |           | 05104517.7    | 26-mei-2005 |

[Brussels #472574 v1]

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Case Number: 07628

**Title:** SUBSTRATE COATED WITH A LAYERED STRUCTURE  
COMPRISING A TETRAHEDRAL CARBON LAYER AND A  
SOFTER OUTER LAYER

**Client:** IC DLC TRIBOLOGICAL COATINGS

**Owner:** NV Bekaert SA

**Disclosure Status:** Filed

**Disclosure Date:**

**Attorney(s):** KH

| Country                                                                                                                    | Sub Case | Case Type | Status | Application Number | Filing Date | Pub Number   | Patent Number | Issue Date | Expiration  |
|----------------------------------------------------------------------------------------------------------------------------|----------|-----------|--------|--------------------|-------------|--------------|---------------|------------|-------------|
| China (People's Republic)                                                                                                  | PCT      | Published |        | 200680029966.1     | 13-jul-2006 | CN101432462A |               |            | 13-jul-2026 |
| <b>App. Title:</b> SUBSTRATE COATED WITH A LAYERED STRUCTURE COMPRISING A TERAHEDRAL CARBON LAYER AND A SOFTER OUTER LAYER |          |           |        |                    |             |              |               |            |             |
| <b>Owner:</b> NV Bekaert SA                                                                                                |          |           |        |                    |             |              |               |            |             |
| European Patent Convention                                                                                                 | PCT      | Published |        | 06777755.7         | 13-jul-2006 | 1915472      |               |            | 13-jul-2026 |
| <b>App. Title:</b> SUBSTRATE COATED WITH A LAYERED STRUCTURE COMPRISING A TERAHEDRAL CARBON LAYER AND A SOFTER OUTER LAYER |          |           |        |                    |             |              |               |            |             |
| <b>Owner:</b> NV Bekaert SA                                                                                                |          |           |        |                    |             |              |               |            |             |
| Japan                                                                                                                      | PCT      | Published |        | 2008-526467        | 13-jul-2006 | 2009-504448  |               |            | 13-jul-2026 |
| <b>App. Title:</b> SUBSTRATE COATED WITH A LAYERED STRUCTURE COMPRISING A TERAHEDRAL CARBON LAYER AND A SOFTER OUTER LAYER |          |           |        |                    |             |              |               |            |             |
| <b>Owner:</b> NV Bekaert SA                                                                                                |          |           |        |                    |             |              |               |            |             |
| United States of America                                                                                                   | PCT      | Published |        | 12/063932          | 13-jul-2006 | 2008/0220257 |               |            | 13-jul-2026 |
| <b>App. Title:</b> SUBSTRATE COATED WITH A LAYERED STRUCTURE COMPRISING A TERAHEDRAL CARBON LAYER AND A SOFTER OUTER LAYER |          |           |        |                    |             |              |               |            |             |
| <b>Owner:</b> NV Bekaert SA                                                                                                |          |           |        |                    |             |              |               |            |             |

**Abstract:** The invention relates to a substrate coated at least partially with a layered structure. The layered structure comprises an intermediate layer deposited on the substrate and an amorphous carbon layer deposited on the intermediate layer. The amorphous carbon layer has a Young's modulus lower than 200 GPa. The intermediate layer comprises a tetrahedral carbon layer having a Young's modulus higher than 200 GPa.  
The invention further relates to a method to reduce the wear on a counterbody of a substrate coated with a tetrahedral carbon coating.

### Priorities

| Country                    | Case Type | Application # | Filing Date |
|----------------------------|-----------|---------------|-------------|
| European Patent Convention | PRI       | 05107584.4    | 18-aug-2005 |

[Brussels #472574 v1]

donderdag 25 februari 2010

## Master List

Page: 34

Case Number: 08256

Title: A HYDROGENATED AMORPHOUS CARBON COATING (VIA ETP)

Client: IC DLC TRIBOLOGICAL COATINGS

Owner: NV Bekaert SA

Disclosure Status: Filed

Disclosure Date:

Attorney(s): KH

| Country                                                       | Sub Case | Case Type | Status    | Application Number | Filing Date | Pub Number | Patent Number | Issue Date | Expiration  |
|---------------------------------------------------------------|----------|-----------|-----------|--------------------|-------------|------------|---------------|------------|-------------|
| China (People's Republic)                                     | PCT      | Pending   | Pending   | 200880004149.X     | 05-feb-2008 |            |               |            | 05-feb-2028 |
| App. Title: A HYDROGENATED AMORPHOUS CARBON COATING (VIA ETP) |          |           |           |                    |             |            |               |            |             |
| Owner: NV Bekaert SA                                          |          |           |           |                    |             |            |               |            |             |
| European Patent Convention                                    | PCT      | Published | Published | 08708689.8         | 05-feb-2008 | 2109693    |               |            | 05-feb-2028 |
| App. Title: A HYDROGENATED AMORPHOUS CARBON COATING (VIA ETP) |          |           |           |                    |             |            |               |            |             |
| Owner: NV Bekaert SA                                          |          |           |           |                    |             |            |               |            |             |
| India                                                         | PCT      | Pending   | Pending   | 4454/DELNP/2009    | 05-feb-2008 |            |               |            | 05-feb-2028 |
| App. Title: A HYDROGENATED AMORPHOUS CARBON COATING (VIA ETP) |          |           |           |                    |             |            |               |            |             |
| Owner: NV Bekaert SA                                          |          |           |           |                    |             |            |               |            |             |
| United States of America                                      | PCT      | Pending   | Pending   | 12/524793          | 05-feb-2008 |            |               |            | 05-feb-2028 |
| App. Title: A HYDROGENATED AMORPHOUS CARBON COATING (VIA ETP) |          |           |           |                    |             |            |               |            |             |
| Owner: NV Bekaert SA                                          |          |           |           |                    |             |            |               |            |             |

Abstract: The invention relates to a hydrogenated amorphous carbon coating characterized by a substantial absence of sp1 hybridized CH endgroups, and/or by a substantial absence of sp2 hybridized CH2 endgroups and/or of sp3 hybridized CH3 end groups.

The invention further relates to a method to deposit such a hydrogenated amorphous carbon coating on a substrate - ETP = expanding thermal plasma).

### Priorities

| Country                    | Case Type | Application # | Filing Date |
|----------------------------|-----------|---------------|-------------|
| European Patent Convention | PRI       | EP07101781.8  | 06-feb-2007 |

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donderdagdag 25 februari 2010

Master List

Page: 35

Case Number: 10054

Title: A SUBSTRATE COATED WITH AMORPHOUS  
HYDROGENATED CARBON

Client: IC DLC TRIBOLOGICAL COATINGS

Owner: NV Bekaert SA

Disclosure Status: Filed

Disclosure Date:

Attorney(s): KH

| Country                                                           | Sub Case | Case Type | Status    | Application Number | Filing Date | Pub Number   | Patent Number | Issue Date | Expiration |
|-------------------------------------------------------------------|----------|-----------|-----------|--------------------|-------------|--------------|---------------|------------|------------|
| Patent Cooperation Treaty                                         | ORD      |           | Published | EP2008/067612      | 16-dec-2008 | WO2009/08061 |               |            |            |
| App. Title: A SUBSTRATE COATED WITH AMORPHOUS HYDROGENATED CARBON |          |           |           |                    |             |              |               |            |            |
| Owner: NV Bekaert SA                                              |          |           |           |                    |             |              |               |            |            |

**Abstract:** The invention relates to a substrate being at least partially coated with a coating comprising at least a first layer and a second layer. The first layer and the second layer comprise amorphous hydrogenated carbon. The first layer has a first E04 optical band gap and the second layer has a second E04 optical band gap. The said second E04 optical band gap is smaller than said first E04 optical band gap.

The invention further relates to a method to deposit such a coating on a substrate.

Priorities

| Country                    | Case Type | Application # | Filing Date |
|----------------------------|-----------|---------------|-------------|
| European Patent Convention | PRI       | 07150241.3    | 20-dec-2007 |

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