

10/17/2011

RECORDATION FORM COVER SHEET

U.S. DEPARTMENT OF COMMERCE

Patent and Trademark Office



103634617

PATENTS ONLY

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
☐ Other _____

City: Am Boettcherberg 30-38

State/Prov.: _____

Country: GERMANY ZIP: _____

Additional name(s) & 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)

5,718,976



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 10/18/2011 Last 4 Numbers See enclosed PTO-2038ARULLINS 00000007 5718976Expiration Date 01 OCT 2011

b. Deposit Account Number _____

40.00 00

Authorized User Name _____

9. Signature:

Signature

October 12, 2011

Date

Peter Rogalskyj

Name of Person Signing

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

38

PATENT

REEL: 027191 FRAME: 0230

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.

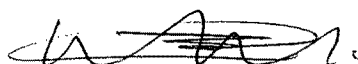
Als gevolg hiervan wordt Sulzer Metaplas GmbH de enige en uitsluitende eigenaar
Therefore, Sulzer Metaplas GmbH, becomes the sole proprietor
Par consequent, Sulzer Metaplas GmbH, devient le seul et exclusif propriétaire

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

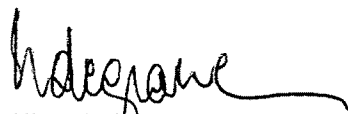
Opgemaakt te Zwevegem, België, op 23 augustus 2010.
Drawn up at Zwevegem, Belgium, on 23 August 2010.
Fait à Zwevegem, Belgique, le 23 août 2010.

NV BEKAERT SA

Sulzer Metaplas GmbH



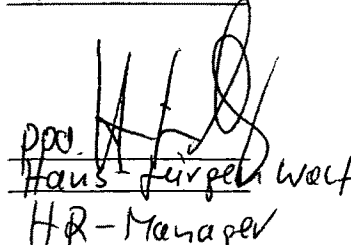
Bruno Humblet
Group Executive Vice President



Albrecht De Graeve
Chief Executive Officer



Valentin Buhle



Hans-Jürgen Wolf
HR-Manager

PATENT

REEL: 027191 FRAME: 0231

1. Patents

[Brussels #472574 v1]

0

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
<i>App. Title:</i> IMPROVED DIAMOND-LIKE NANOCOMPOSITE COMPOSITIONS									
<i>Owner:</i> NV Bekaert SA									
France	EPC	Granted		97920688.5	11-apr-1997	896640	896640	06-feb-2002	11-apr-2017
<i>App. Title:</i> IMPROVED DIAMOND-LIKE NANOCOMPOSITE COMPOSITIONS									
<i>Owner:</i> NV Bekaert SA									
Germany	EPC	Granted		97920688.5	11-apr-1997	896640	69710324.2-08	06-feb-2002	11-apr-2017
<i>App. Title:</i> IMPROVED DIAMOND-LIKE NANOCOMPOSITE COMPOSITIONS									
<i>Owner:</i> NV Bekaert SA									
Japan	PCT	Granted		537689/97	11-apr-1997	2000-508713	4439594	15-jan-2010	11-apr-2017
<i>App. Title:</i> IMPROVED DIAMOND-LIKE NANOCOMPOSITE COMPOSITIONS									
<i>Owner:</i> NV Bekaert SA									
Luxembourg	EPC	Granted		97920688.5	11-apr-1997	896640	896640	06-feb-2002	11-apr-2017
<i>App. Title:</i> IMPROVED DIAMOND-LIKE NANOCOMPOSITE COMPOSITIONS									
<i>Owner:</i> NV Bekaert SA									
Netherlands	EPC	Granted		97920688.5	11-apr-1997	896640	896640	06-feb-2002	11-apr-2017
<i>App. Title:</i> IMPROVED DIAMOND-LIKE NANOCOMPOSITE COMPOSITIONS									
<i>Owner:</i> NV Bekaert SA									
Taiwan	ORD	Granted		86105584	26-apr-1997	420724	126613	28-mei-2001	26-apr-2017
<i>App. Title:</i> IMPROVED DIAMOND-LIKE NANOCOMPOSITE COMPOSITIONS									
<i>Owner:</i> NV Bekaert SA									
United States of America	PCT	Granted		9/171614	11-apr-1997		6200675	13-mrt-2001	11-apr-2017
<i>App. Title:</i> IMPROVED DIAMOND-LIKE NANOCOMPOSITE COMPOSITIONS									
<i>Owner:</i> NV Bekaert SA									

Abstract: The invention relates to an improved diamond-like nanocomposite composition comprising interpenetrating networks of a-C:H and a-SiO₂ 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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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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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		EPC	Granted	98908033.8	23-jan-1998	963455	963455	02-jan-2002	23-jan-2018
	<i>App. Title:</i> DLN - DLC STACKS								
Belgium		EPC	Granted	98908033.8	23-jan-1998	963455	963455	02-jan-2002	23-jan-2018
	<i>Owner:</i> NV Bekaert SA								
	<i>App. Title:</i> DLN - DLC STACKS								
	<i>Owner:</i> NV Bekaert SA								
Canada		PCT	Granted	2277977	23-jan-1998	98/33948	2277977	31-okt-2006	23-jan-2018
	<i>App. Title:</i> DLN - DLC STACKS								
	<i>Owner:</i> NV Bekaert SA								
France		EPC	Granted	98908033.8	23-jan-1998	963455	963455	02-jan-2002	23-jan-2018
	<i>App. Title:</i> DLN - DLC STACKS								
	<i>Owner:</i> NV Bekaert SA								
Germany		EPC	Granted	98908033.8	23-jan-1998	963455	69803365.5-08	02-jan-2002	23-jan-2018
	<i>App. Title:</i> DLN - DLC STACKS								
	<i>Owner:</i> NV Bekaert SA								
India		ORD	Granted	267/DEL/98	02-feb-1998		215335	25-feb-2008	02-feb-2018
	<i>App. Title:</i> DLN - DLC STACKS								
	<i>Owner:</i> NV Bekaert SA								
Italy		EPC	Granted	98908033.8	23-jan-1998	963455	48690/BE/2002	02-jan-2002	23-jan-2018
	<i>App. Title:</i> DLN - DLC STACKS								
	<i>Owner:</i> NV Bekaert SA								
Japan		PCT	Granted	532542/1998	23-jan-1998	98/33948	4256938	06-feb-2009	23-jan-2018
	<i>App. Title:</i> DLN - DLC STACKS								
	<i>Owner:</i> NV Bekaert SA								

[Brussels #472574 v1]

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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:</i> NV Bekaert SA									
Netherlands	DLN - DLC STACKS	EPC	Granted	98908033.8	23-jan-1998	963455	963455	02-jan-2002	23-jan-2018
<i>Owner:</i> NV Bekaert SA									
Spain	DLN - DLC STACKS	EPC	Granted	98908033.8	23-jan-1998	963455	2171010 T3	02-jan-2002	23-jan-2018
<i>App.Title:</i> NV Bekaert SA									
Switzerland	DLN - DLC STACKS	EPC	Granted	98908033.8	23-jan-1998	963455	963455	02-jan-2002	23-jan-2018
<i>Owner:</i> NV Bekaert SA									
United Kingdom	DLN - DLC STACKS	EPC	Granted	98908033.8	23-jan-1998	963455	963455	02-jan-2002	23-jan-2018
<i>App.Title:</i> NV Bekaert SA									
United States of America	DLN - DLC STACKS	PCT	Granted	09/341704	23-jan-1998		6228471	08-mei-2001	23-jan-2018
<i>Owner:</i> NV Bekaert SA									

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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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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Case Number: 04205

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

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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.
Such a layer functions as an excellent adhesion promoting layer for a diamond-like carbon composition coating.
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

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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

Sub Case Case Type Status

Priorities

Case Type Application #

Application Number Filing Date

Filing Date
29-okt-1993
Pub Number

Patent Number

Issue Date Expiration

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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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PATENT

REEL: 027191 FRAME: 0242

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Page: 11

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

Filing Date Filing DatePub

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[Brussels #472574 v1]

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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								
	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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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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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
India	D	DIV	Pending	1164/CHE/2004	06-jun-1996				
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

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

Owner: NV Bekaert SA

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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[Brussels #472574 v1]

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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
<i>App. Title:</i> CAPACITIVE THIN FILMS USING DLN MATERIALS									
Belgium	EPP	Granted		96937640.9	25-sep-1996	1008157	1008157	20-apr-2005	25-sep-2016
<i>Owner:</i> NV Bekaert SA									
<i>App. Title:</i> CAPACITIVE THIN FILMS USING DLN MATERIALS									
China (People's Republic)	PCT	Granted		96198464.3	25-sep-1996	1202978	ZL96198464.3	18-jun-2003	25-sep-2016
<i>Owner:</i> NV Bekaert SA									
<i>App. Title:</i> CAPACITIVE THIN FILMS USING DLN MATERIALS									
France	EPP	Granted		96937640.9	25-sep-1996	1008157	1008157	20-apr-2005	25-sep-2016
<i>Owner:</i> NV Bekaert SA									
<i>App. Title:</i> CAPACITIVE THIN FILMS USING DLN MATERIALS									
Germany	EPP	Granted		96937640.9	25-sep-1996	1008157	69634641.9-08	20-apr-2005	25-sep-2016
<i>Owner:</i> NV Bekaert SA									
<i>App. Title:</i> CAPACITIVE THIN FILMS USING DLN MATERIALS									
India	ORD	Granted		538/MAS/97	14-mrt-1997		206500	27-apr-2007	14-mrt-2017
<i>App. Title:</i> CAPACITIVE THIN FILMS USING DLN MATERIALS									
Japan	PCT	Granted		514314/1997	25-sep-1996		3961025	25-mei-2007	25-sep-2016
<i>Owner:</i> NV Bekaert SA									
<i>App. Title:</i> CAPACITIVE THIN FILMS USING DLN MATERIALS									
Korea, Republic of	PCT	Granted		10-1998-702428	25-sep-1996	1999-63955	10-0449603	10-sep-2004	25-sep-2016
<i>Owner:</i> NV Bekaert SA									
<i>App. Title:</i> CAPACITIVE THIN FILMS USING DLN MATERIALS									

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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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[Brussels #472574 v1]

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		08/833929	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	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	ORD	Granted	09361006	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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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: 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
App. Title: CARBON BASED LOW K MATERIAL									
Owner: 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

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[Brussels #472574 v1]

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 SiO₂ 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 Dylun 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

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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									
Owner: NV Bekaert SA									
China (People's Republic)	PCT	Granted		200480019190.6	01-jul-2004	1816648A	ZL200480019190.6	05-aug-2009	01-jul-2024
App.Title: STACK WITH IMPROVED ADHESION FOR HARD DIAMOND COATING									
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 Ti_xCy or Cr_xCy.

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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.

[Brussels #472574 v1]

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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.									
Owner: NV Bekaert SA									
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

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		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		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		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		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

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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 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

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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
<i>App. Title:</i> PISTON RING HAVING HARD MULTI-LAYER COATING									
<i>Owner:</i> NV Bekaert SA									
European Patent Convention	PCT	Published		06708570.4	01-mrt-2006	1883717			01-mrt-2026
<i>App. Title:</i> PISTON RING HAVING HARD MULTI-LAYER COATING									
<i>Owner:</i> NV Bekaert SA									
United States of America	PCT	Published		11/915246	01-mrt-2006	US2008/020367			01-mrt-2026
<i>App. Title:</i> PISTON RING HAVING HARD MULTI-LAYER COATING									
<i>Owner:</i> NV Bekaert SA									

Abstract: A piston ring (22) is covered at least partially with a layered structure (30). The layered structure (30) comprises:

- a first intermediate layer (32) comprising at least one element of group IVB, group VB or group VIB;
- a second intermediate layer (34) deposited on top of the first intermediate layer (32) and comprising a diamond-like nanocomposite composition;
- 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

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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

[Brussels #472574 v1]

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donderdag 25 februari 2010

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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[Brussels #472574 v1]