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| PATENT ASSIGNMENT COVER SHEET |
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| SUBMISSION TYPE: | NEW ASSIGNMENT |
| NATURE OF CONVEYANCE: | ASSIGNMENT |
| CONVEYING PARTY DATA | |
| Name | Execution Date |
| YU-SHENG WANG | 04/14/2017 |
| CHI-CHENG HUNG | 04/14/2017 |
| CHEN-YUAN KAO | 04/14/2017 |
| YI-WEI CHIU | 04/14/2017 |
| LIANG-YUEH OU YANG | 04/14/2017 |
| YUEH-CHING PAI | 04/14/2017 |
| RECEIVING PARTY DATA | |
| Name: | Taiwan Semiconductor Manufacturing Company, Ltd. |
| Street Address: | 8, Li-Hsin Rd. 6, Hsinchu Science Park |
| City: | HsinChu |
| State/Country: | TAIWAN |
| Postal Code: | 300-78 |
| PROPERTY NUMBERS Total: 1 | |
| Property Type | Number |
| Application Number: | 15492113 |
| CORRESPONDENCE DATA | |
| Fax Number: | (972)732-9218 |
| <i>Correspondence will be sent to the e-mail address first; if that is unsuccessful, it will be sent using a fax number, if provided; if that is unsuccessful, it will be sent via US Mail.</i> | |
| Phone: | 972-732-1001 |
| Email: | docketing@slatermatsil.com |
| Correspondent Name: | SLATER MATSIL, LLP |
| Address Line 1: | 17950 PRESTON RD., SUITE 1000 |
| Address Line 4: | DALLAS, TEXAS 75252 |
| ATTORNEY DOCKET NUMBER: | TSMP20160964US00 |
| NAME OF SUBMITTER: | MARANDA BRALLEY |
| SIGNATURE: | /Maranda Bralley/ |
| DATE SIGNED: | 05/22/2017 |
| Total Attachments: 2 | |

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ATTORNEY DOCKET NO.
TSMP20160964US00

ASSIGNMENT

WHEREAS, I, the undersigned inventor (or one of the undersigned joint inventors), of residence as listed, having invented certain new and useful improvements as below entitled, for which application for United States Letters Patent is made; and

WHEREAS, Taiwan Semiconductor Manufacturing Company, Ltd. ("Assignee"), a corporation organized and existing under the laws of Taiwan, with its principal office at 8, Li-Hsin Rd. 6 Hsinchu Science Park, Hsinchu 300-78 Taiwan, is desirous of acquiring my entire right, title and interest in and to said invention, and to said application and any Letters Patent that may issue thereon in the United States and all other countries throughout the world;

NOW, THEREFORE, for good and valuable consideration, the receipt of which is hereby acknowledged, I hereby sell and assign to said Assignee, its successors and assigns, my entire right, title and interest in and to said invention and in and to said application and all patents which may be granted therefor, and all future non-provisional applications including divisions, reissues, substitutions, continuations, and extensions thereof; and I hereby authorize and request the Commissioner for Patents to issue all patents for said invention, or patent resulting therefrom, insofar as my interest is concerned, to said Assignee, as assignee of my entire right, title and interest. I declare that I have not executed and will not execute any agreement in conflict herewith.

I also hereby sell and assign to Assignee, its successors and assigns, my foreign rights to the invention disclosed in said application, in all countries of the world, including, but not limited to, the right to file applications and obtain patents under the terms of the International Convention for the Protection of Industrial Property, and of the European Patent Convention, and further agree to execute any and all patent applications, assignments, affidavits, and any other papers in connection therewith necessary to perfect such patent rights.

I hereby further agree that I will communicate to said Assignee, or to its successors, assigns, and legal representatives, any facts known to me respecting said invention or the file history thereof, and at the expense of said Assignee, its legal representatives, successors, or assigns, will testify in any legal proceedings, sign all lawful papers, execute all divisional, continuation, reissue and substitute applications, make all lawful oaths, and generally do everything possible to aid said Assignee, its legal representatives, successors, and assigns, to obtain and enforce proper patent protection for said invention in all countries.

IN WITNESS WHEREOF, I hereunto set my hand and seal this day and year;

| TITLE OF INVENTION | Methods for Forming Contact Plugs with Reduced Corrosion | | | |
|--------------------------------|--|---|---------------------------------------|-----------------------------------|
| SIGNATURE OF INVENTOR AND NAME | <i>Yu Sheng Wang</i> Yu-Sheng Wang | <i>Chi-Cheng Hung</i> Chi-Cheng Hung | <i>Chen-Yuan Kao</i> Chen-Yuan Kao | <i>Yi-Wei Chiu</i> Yi-Wei Chiu |
| DATE | 2017/4/14 | 2017/04/14 | 2017/04/14 | 2017/4/14 |
| RESIDENCE | Tainan City, Taiwan | Tainan City, Taiwan | Zhudong Township, Taiwan | Kaohsiung City, Taiwan |

ATTORNEY DOCKET NO.
TSPMP20160964US00

ASSIGNMENT

WHEREAS, I, the undersigned inventor (or one of the undersigned joint inventors), of residence as listed, having invented certain new and useful improvements as below entitled, for which application for United States Letters Patent is made; and

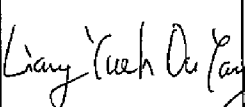
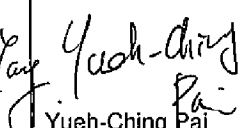
WHEREAS, Taiwan Semiconductor Manufacturing Company, Ltd. ("Assignee"), a corporation organized and existing under the laws of Taiwan, with its principal office at 8, Li-Hsin Rd. 6 Hsinchu Science Park, Hsinchu 300-78 Taiwan, is desirous of acquiring my entire right, title and interest in and to said invention, and to said application and any Letters Patent that may issue thereon in the United States and all other countries throughout the world;

NOW, THEREFORE, for good and valuable consideration, the receipt of which is hereby acknowledged, I hereby sell and assign to said Assignee, its successors and assigns, my entire right, title and interest in and to said invention and in and to said application and all patents which may be granted therefor, and all future non-provisional applications including divisions, reissues, substitutions, continuations, and extensions thereof; and I hereby authorize and request the Commissioner for Patents to issue all patents for said invention, or patent resulting therefrom, insofar as my interest is concerned, to said Assignee, as assignee of my entire right, title and interest. I declare that I have not executed and will not execute any agreement in conflict herewith.

I also hereby sell and assign to Assignee, its successors and assigns, my foreign rights to the invention disclosed in said application, in all countries of the world, including, but not limited to, the right to file applications and obtain patents under the terms of the International Convention for the Protection of Industrial Property, and of the European Patent Convention, and further agree to execute any and all patent applications, assignments, affidavits, and any other papers in connection therewith necessary to perfect such patent rights.

I hereby further agree that I will communicate to said Assignee, or to its successors, assigns, and legal representatives, any facts known to me respecting said invention or the file history thereof, and at the expense of said Assignee, its legal representatives, successors, or assigns, will testify in any legal proceedings, sign all lawful papers, execute all divisional, continuation, reissue and substitute applications, make all lawful oaths, and generally do everything possible to aid said Assignee, its legal representatives, successors, and assigns, to obtain and enforce proper patent protection for said invention in all countries.

IN WITNESS WHEREOF, I hereunto set my hand and seal this day and year;

| | | | | |
|--------------------------------|---|---|--|--|
| TITLE OF INVENTION | Methods for Forming Contact Plugs with Reduced Corrosion | | | |
| SIGNATURE OF INVENTOR AND NAME |  Liang-Yueh Ou Yang |  Yueh-Ching Pai | | |
| DATE | 2017.04.14 | 2017.04.14 | | |
| RESIDENCE | New Taipei City, Taiwan | Taichung City, Taiwan | | |