

EXHIBIT I



United States Patent [19]
Iacoponi

[11] Patent Number: 5,545,592
[45] Date of Patent: Aug. 13, 1996

[54] NITROGEN TREATMENT FOR METAL-SILICIDE CONTACT

[75] Inventor: John A. Iacoponi, San Jose, Calif.
[73] Assignee: Advanced Micro Devices, Inc., Sunnyvale, Calif.

[21] Appl. No.: 393,635

[22] Filed: Feb. 24, 1995

[51] Int. Cl.⁶ H01L 21/28

[52] U.S. Cl. 437/200; 437/192

[58] Field of Search 437/200, 201, 437/192, 190; 257/757, 764, 768

[56] References Cited

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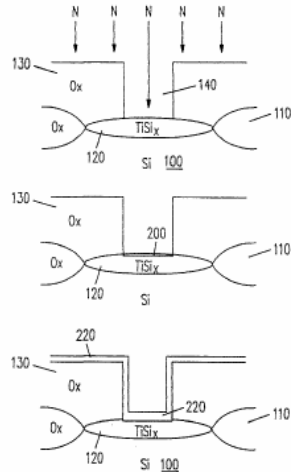
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[57] ABSTRACT

A low-resistance contact for use in integrated circuits is formed by creating a titanium silicide layer on a semiconductor body and treating the titanium silicide layer with active free nitrogen to form a surface comprised of titanium nitride. This titanium nitride surface is then overlaid with an additional deposition of titanium nitride. Finally, a layer of conductive metal, such as tungsten, is formed over the second titanium nitride layer by chemical vapor deposition. This process eliminates the need for a titanium-metal deposition step and the defects associated with potential reactions between tungsten hexafluoride gas and titanium metal.

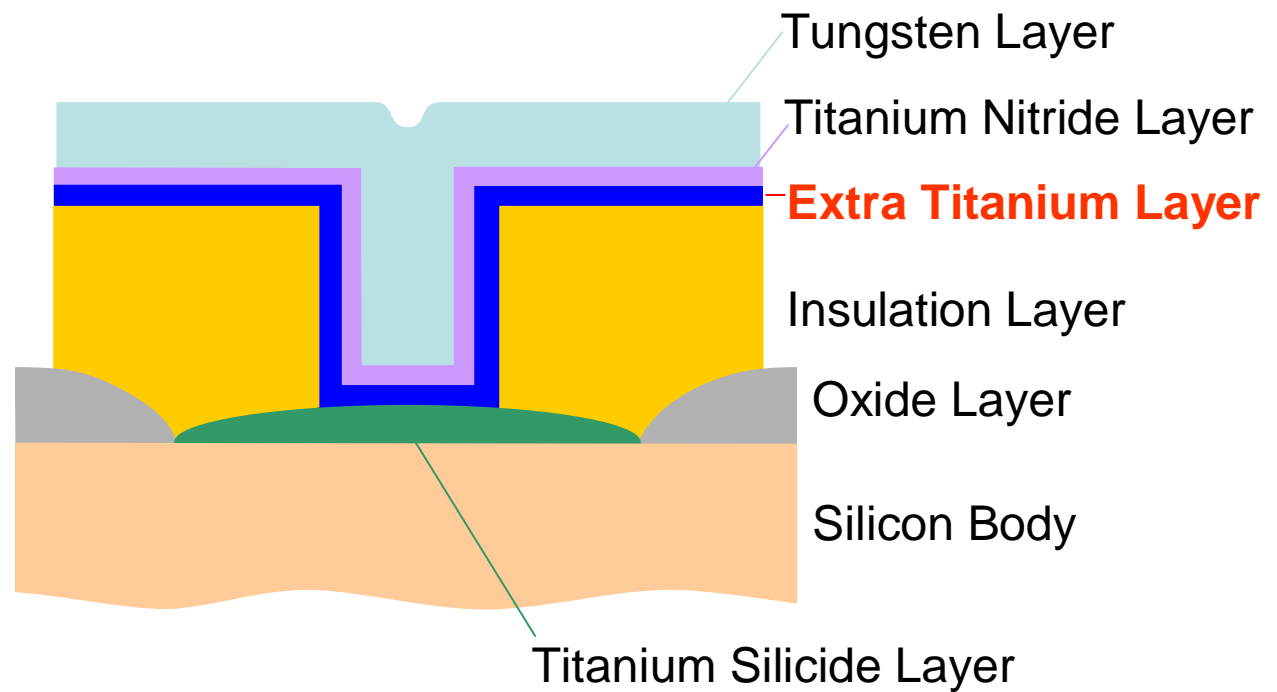
9 Claims, 4 Drawing Sheets



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Iacoponi: '592 Patent

Before Iacoponi: Extra Titanium Layer

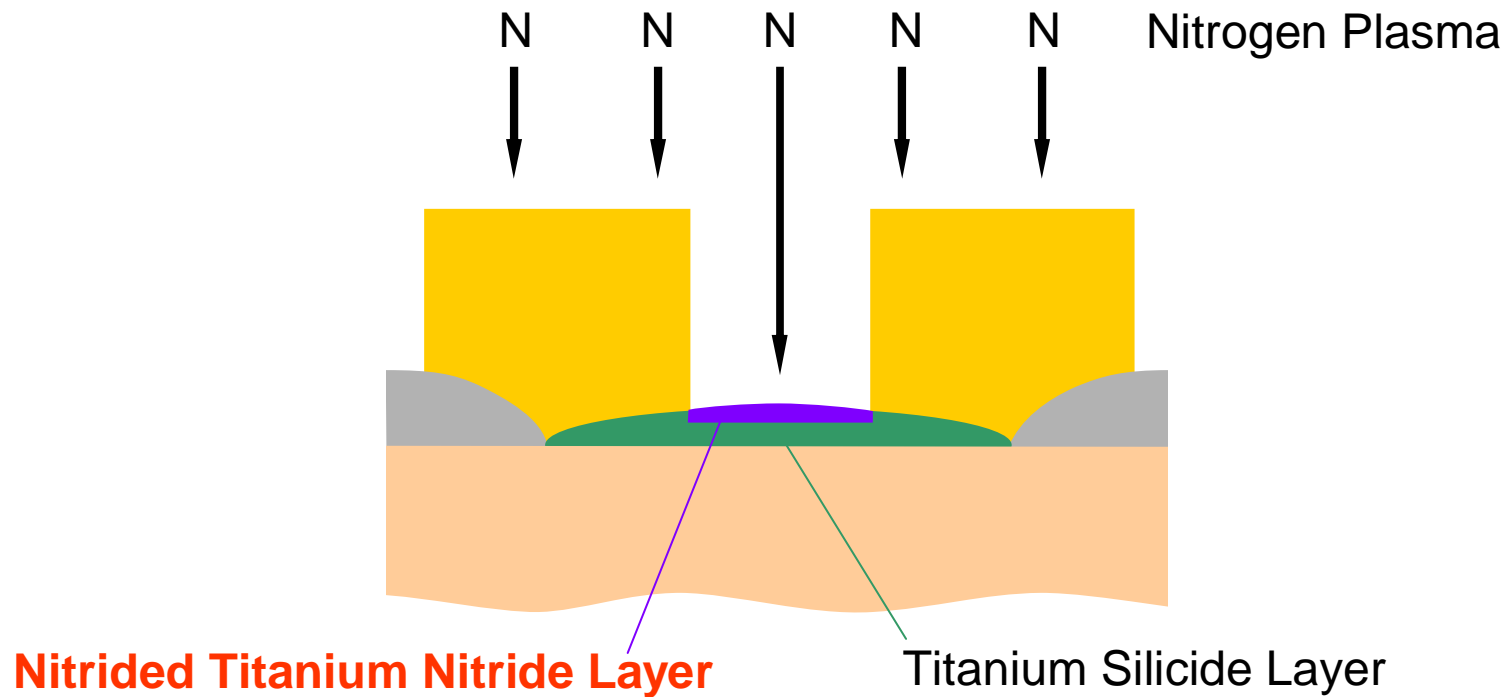


PRIOR ART CONTACT

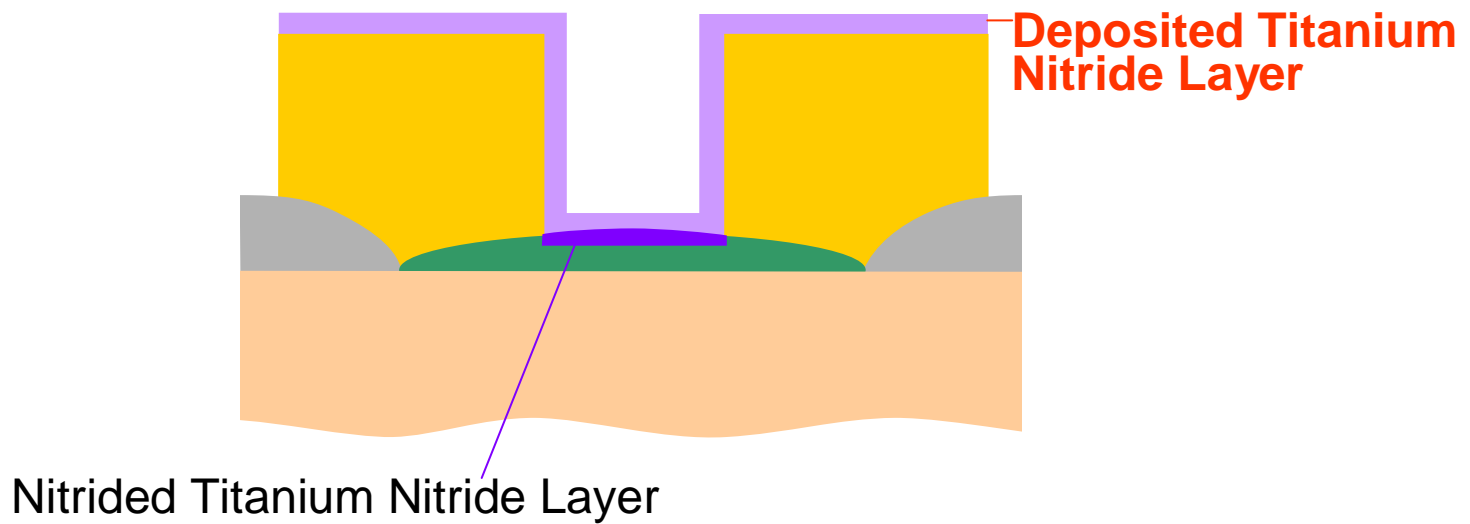
Iacoponi: '592 Patent Statement of Invention

The invention is an improved process for creating a contact without depositing multiple titanium layers. This is accomplished by nitridding the surface of the titanium silicide to create titanium nitride and depositing a titanium nitride layer over it.

Iacoponi: '592 Patent Nitriding the Titanium Silicide to Create Titanium Nitride

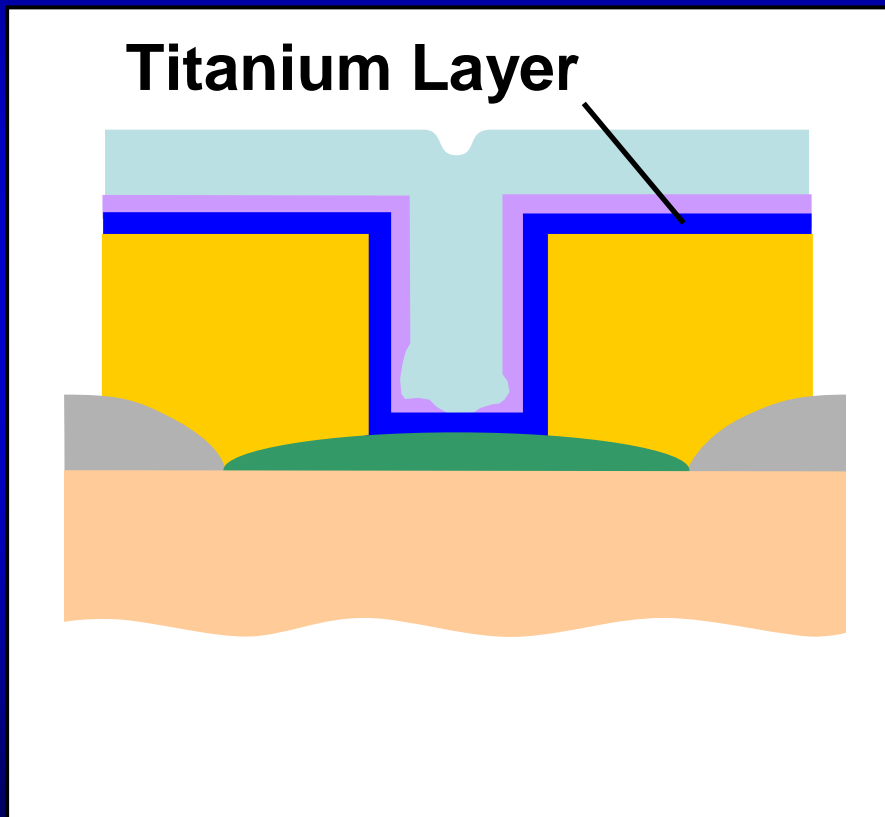


Iacoponi: '592 Patent Depositing a Titanium Nitride Layer



Iacoponi: '592 Patent Titanium Layer Eliminated

Prior Art



Iacoponi Invention

