(12) UK Patent (19) GB (11) 2 298 657 (13) B

(54) Title of Invention

Methods of forming metal interconnects in semiconductor devices

(51) INT CL[6]; **C23C 16/56 16/34 // H01L 21/768**

(21) Application No
9604614.9

(22) Date of filing
04.03.1996

(30) Priority Data

(31) **95004447**

(32) **04.03.1995**

(33) **KR**

(43) Application published
11.09.1996

(45) Patent published
30.09.1998

(52) Domestic classification
(Edition P)
C7F FHE FP810 FQ841 FQ851 FQ861 FQ916 FR861 FR864 F802 F809
H1K KHAAB K4C3G K4C8 K4F16 K4F26 K4G3Y
U1S S1421 S2061

(56) Documents cited
EP0525637 A1
EP0514103 A1
EP0209654 A2
US5494860 A
US5136362 A

(58) Field of search

As for published application 2298657 A *viz:*
UK CL(Edition O) **C7F FACE FACX FAHE FAHX FAXE FAXX FHB FHE FHX, H1K KHAAB KHAAX KHABX KHAD**
INT CL[6] **C23C 14/06 14/58 16/34 16/56, H01L 21/285**
Online: WPI, CLAIMS
updated as appropriate

(72) Inventor(s)
Gyung-Su Cho

(73) Proprietor(s)
Hyundai Electronics Industries Co., Ltd.

(Incorporated in the Republic of Korea)

San 136-1, Ami-ri
Bubal-eub
Ichon-kun Kyoungki-do
Republic of Korea

(74) Agent and/or
Address for Service
A A Thornton & Co
Northumberland House
303-306 High Holborn
London
WC1V 7LE
United Kingdom

PRIOR ART

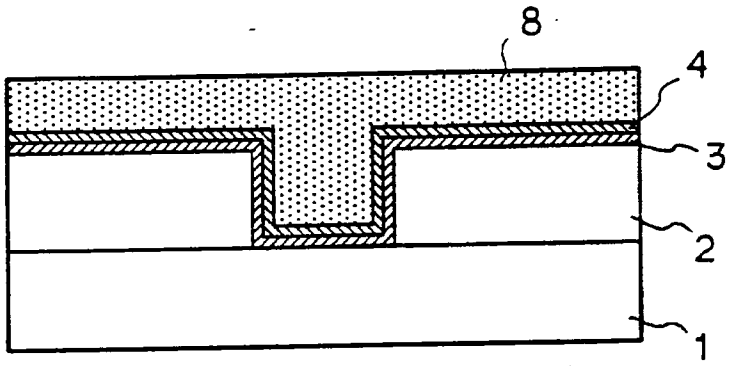

FIG. 1

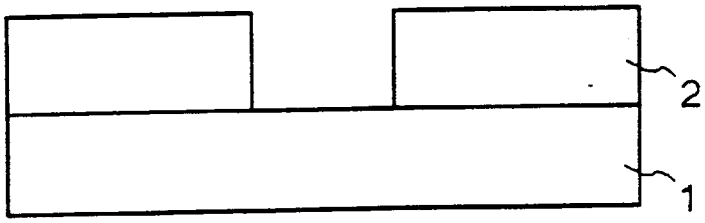

FIG. 2A

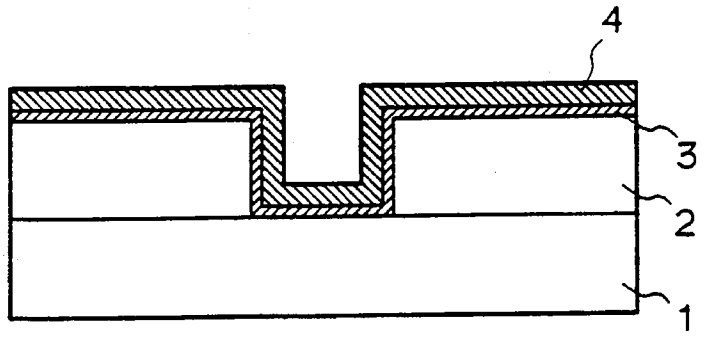

FIG. 2B

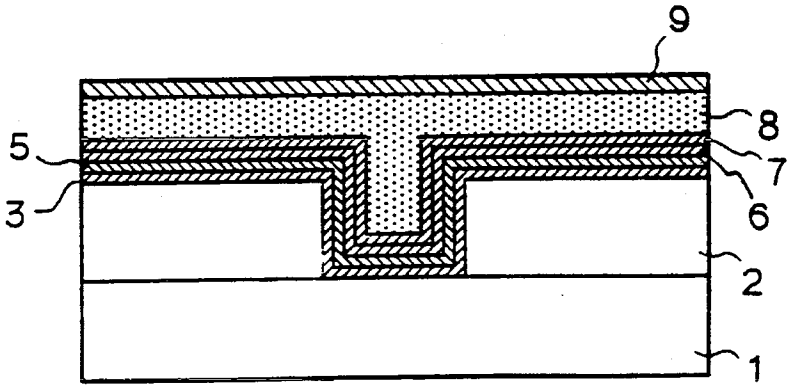

FIG. 2C

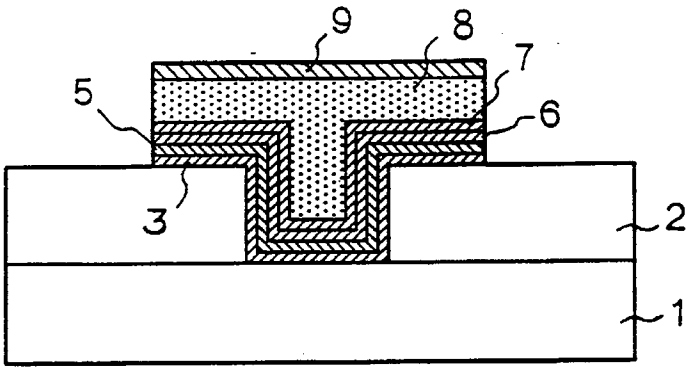

FIG. 2D

METHODS OF FORMING METAL INTERCONNECTS IN SEMICONDUCTOR DEVICES

FIELD OF THE INVENTION

The present invention relates to a method of forming a semiconductor device, and more particularly to a method of forming a metal interconnect in a semiconductor device including a diffusion barrier metal layer.

DESCRIPTION OF THE PRIOR ART

As the integration of semiconductor device is increased, many methods have been studied to make the interconnect design free and easy, and to make the designation of resistance and current capacitance variable.

In general, aluminum is widely used as the material for metal interconnect of semiconductor device. As the integration is increased, the width of the interconnect is fine, so the current density is increased. The increase of the current density, however, generates failure due to electromigration, anti-reflection and movement of stress, which results in a drop in the reliability. To solve the above problems, a method that deposits copper(Cu) or titanium(Ti) on the interconnect of aluminum(Al) has been provided, but it leads to serious problems such as the failure of insulator and a short of interconnects due to phenomena such as hillock and whisker.

Fig. 1 is a sectional view of semiconductor device forming the metal interconnect after the formation of the diffusion barrier layer according to an embodiment of the conventional art. In the conventional method, an insulating layer 2 is first formed on a semiconductor substrate 1. Afterwards, contact holes are formed at the predetermined portions of the insulating layer 2 on the semiconductor substrate 1 by etching some portions of the insulating layer till the surface of the substrate 1 is exposed. Next, diffusion barrier layers of titanium(Ti) 3 and titanium nitride(TiN) 4 are orderly formed by Physical Vapor Deposition. Lastly, metal interconnect 8 using aluminum metal or aluminum alloy is formed

DOCKET ALARM

Explore Litigation Insights

Docket Alarm provides insights to develop a more informed litigation strategy and the peace of mind of knowing you're on top of things.

Real-Time Litigation Alerts

Keep your litigation team up-to-date with **real-time alerts** and advanced team management tools built for the enterprise, all while greatly reducing PACER spend.

Our comprehensive service means we can handle Federal, State, and Administrative courts across the country.

Advanced Docket Research

With over 230 million records, Docket Alarm's cloud-native docket research platform finds what other services can't. Coverage includes Federal, State, plus PTAB, TTAB, ITC and NLRB decisions, all in one place.

Identify arguments that have been successful in the past with full text, pinpoint searching. Link to case law cited within any court document via Fastcase.

Analytics At Your Fingertips

Learn what happened the last time a particular judge, opposing counsel or company faced cases similar to yours.

Advanced out-of-the-box PTAB and TTAB analytics are always at your fingertips.

API

Docket Alarm offers a powerful API (application programming interface) to developers that want to integrate case filings into their apps.

LAW FIRMS
Build custom dashboards for your attorneys and clients with live data direct from the court.

Automate many repetitive legal tasks like conflict checks, document management, and marketing.

FINANCIAL INSTITUTIONS
Litigation and bankruptcy checks for companies and debtors.

E-DISCOVERY AND LEGAL VENDORS
Sync your system to PACER to automate legal marketing.