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DIFFUSION BARRIER LAYER AND SEMICONDUCTOR DEVICE CONTAINING SAME

ABSTRACT

A semiconductor device containing a diffusion barrier layer (14) is provided. The semiconductor device includes at least a semiconductor substrate (8) containing conductive metal elements; and, a diffusion barrier layer (14) applied to at least a portion of the substrate (8) in contact with conductive metal elements (12). The diffusion barrier layer (14) can have an upper surface (14a) and a lower surface (14b) and a central portion (14c), and being formed from silicon, carbon, nitrogen and hydrogen with the nitrogen being non-uniformly distributed throughout the diffusion barrier layer (14). Thus, the nitrogen can be more concentrated near the lower (14b) and/or upper (14a) surfaces of the diffusion barrier layer (14) as compared to the central portion (14c) of the diffusion barrier layer (14). Methods for making the semiconductor devices are also provided.

Fig. 1B

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