Abstract of the Disclosure

TREATMENT OF A METAL NITRIDE/METAL STACK

A method for processing a substrate comprising the formation of a metal nitride/metal stack suitable for use as a barrier/liner for sub-0.18μm device fabrication. After a metal nitride layer is deposited upon a metal layer, the metal nitride layer is exposed to a treatment step in a nitrogen-containing environment, e.g., a plasma. The plasma treatment modifies the entire metal nitride layer and a top portion of the underlying metal layer. The plasma adds nitrogen to the top portion of the metal layer, resulting in the formation of a nitrated-metal layer. Aside from reducing the microstructure mismatch across the nitride-metal interface, the plasma treatment also densifies and reduces impurities from the deposited nitride layer. The resulting nitride/metal stack exhibits improved film properties, including enhanced adhesion and barrier characteristics. A composite nitride layer of a desired thickness can also be formed by repeating the deposition and treatment cycles of thinner component nitride layers.

Fig. 1