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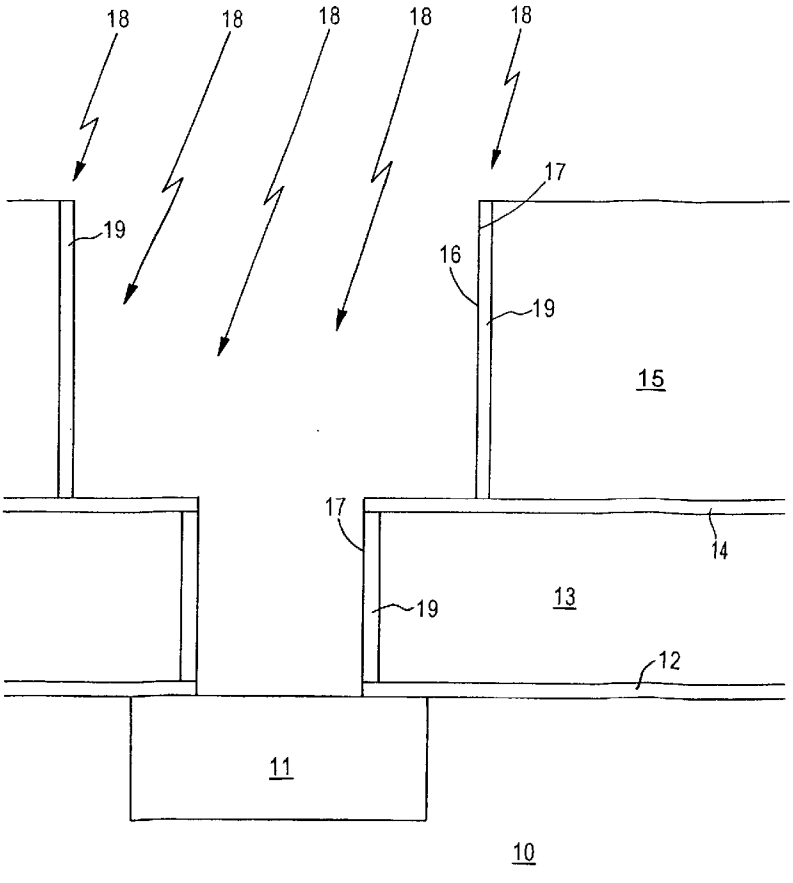
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(54) Title: INTERCONNECTS WITH IMPROVED BARRIER LAYER ADHESION



(57) Abstract: Semiconductor devices comprising interconnect with improved adhesion of barrier layers to dielectric layers are formed by laser thermal annealing exposed surfaces of a dielectric layer in an atmosphere of NH_3 and N_2, and subsequently depositing Ta to form a composite barrier layer. Embodiments include forming a dual damascene opening in an interlayer dielectric comprising F-containing silicon oxide, such as F-containing silicon oxide derived from F-TEOS, laser thermal annealing the exposed silicon oxide surface in NH_3 and N_2, depositing Ta and then filling the opening with Cu. Laser thermal annealing in NH_3 and N_2 depletes the exposed silicon oxide surface of F while forming an N_2-rich surface region. Deposited Ta reacts with the N_2 om the N_2-rich surface region to form a composite barrier layer comprising a graded layer of tantalum nitride and a layer of α-Ta thereon.

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