

ABSTRACT OF THE DISCLOSURE

The invention provides a method for forming a metal nitride film by depositing a metal oxide film on the substrate and exposing the metal oxide film to a nitrating gas to densify the metal oxide and form a metal nitride film. The metal oxide film is deposited by the decomposition of a chemical vapor deposition precursor. The nitrating step comprises exposing the metal oxide film to a thermally or plasma enhanced nitrating gas preferably comprising nitrogen, oxygen, and ammonia. The invention also provides a process for forming a liner/barrier scheme for a metallization stack by forming a metal nitride layer over the substrate by the densification of a metal oxide layer by a nitrating gas depositing a metal liner layer. Optionally, a metal liner layer may be deposited over substrate prior to the metal nitride layer to form a metal/metal nitride liner/barrier scheme. The invention further provides a process to form a microelectronic device comprising forming a first electrode, forming a metal nitride layer over the first electrode by densifying a metal oxide layer by a nitrating gas to form a metal nitride layer, depositing a dielectric layer over the metal nitride layer, and forming a second electrode over the dielectric layer. Alternatively, the metal nitride film may comprise the first and second electrodes.

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