INTEGRATED CIRCUIT DEVICE WITH COMPOSITE OXIDE DIELECTRIC

Abstract

An integrated circuit device includes a semiconductor substrate and a first metal oxide layer adjacent the substrate. The first metal oxide layer may be formed of tantalum oxide, for example. A second metal oxide layer, which includes an oxide with a relatively high dielectric constant such as titanium oxide, zirconium oxide, or ruthenium oxide, is formed on the first metal oxide layer opposite the semiconductor substrate, and a metal nitride layer, such as titanium nitride, is formed on the metal oxide layer opposite the first metal oxide layer. The metal nitride layer includes a metal which is capable of reducing the first metal oxide layer. Thus, the second metal oxide layer substantially blocks reduction of the first metal oxide layer by the metal of the metal nitride layer.

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