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Microstructure and Mechanical Properties of Sputter Deposited Tantalum Nitride Thin Films after High Temperature Loading

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Abstract:

The properties of tantalum nitride thin films sputter deposited with and without breaks on pure and oxidized silicon wafers were investigated with respect to their potential use as strain gauges in micromachined sensors for harsh environmental applications. The thin films were deposited using direct current magnetron sputtering at a constant back pressure and plasma power. To lower the deposition temperature the film synthesis is done in intervals allowing the use of lift-off technology to pattern the thin films. For the evaluation of microstructural, chemical and mechanical film properties, a large variety of techniques such as focused ion beam, scanning electron microscopy, X-ray photoelectron spectroscopy, glow discharge optical emission spectroscopy, X-ray diffraction and wafer bow measurements were applied. Basically, the thermal oxidation of the thin films leads to a

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