

Oxidation of ScN films and effect on these properties.

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Scandium nitride (ScN) is a rocksalt-structure semiconductor that has attracted attention for its potential applications in thermoelectric energy conversion devices, as a semiconducting component in epitaxial metal/semiconductor superlattices. This material presents a strong sensitivity to the air and can quickly oxidize. ScN layers were deposited onto the surface of MgO (001) substrate at different temperatures. A strong correlation was observed between the oxidation level of layers and the crystallization of films. The shift of the first direct band gap was measured from 2.1 eV and 2.6 eV and can be correlated with the observed change of the carrier concentration. In the best condition of deposition, several thicknesses of ScN varying from 60 nm to 1 μm were deposited. A change in the crystalline orientation of the ScN films was observed as a function of the thickness. Positron measurements were performed to measure the defects concentration in the films induced by this changing. Pulsed positron beam measurements were employed in order to determine the type and the concentration of defects in the films induced by this changing.

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