

Long term oxidization and phase transition of InN epitaxial nanotextures

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The long term oxidization (aging) of hcp-InN (wurtzite, InN-w) epitaxial nanotextures synthesized on Si substrates is analyzed. The densely packed layers of InN-w nanotexture (5-100 nm), were eventually oxidized by atmospheric oxygen through the formation of an intermediate amorphous In-O_x-N_y (indium oxynitride) phase, directly identified with high resolution transmission electron microscopy.

The hcp-InN single-phase nanotexture was continuously transforming to a bi-phase alloy hcp-InN /bcc-In₂O₃ texture. The oxidization process is associated to the large accumulation of charges on the periphery of nanotextures, which increases the reactivity of oxygen locally.

Using energy-dispersive X-ray spectroscopy and selected area electron diffraction, it was found that the concentration of bcc-In₂O₃ phase in the alloy, was higher at the texture areas of small size (~5nm) in comparison to the larger texture dimensions (>30nm).