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AlN, InN, and their alloys' growth issues in Plasma Source MBE.[1]

YURIY DANYLYUK, GREGORY AUNER, Wayne State University SSIM — A systematic investigation of the growth of AlN, InN,and InAlN by Plasma Source MBE (PSMBE) was performed. The growth conditions were optimized based on RHEED analysis during growth and dissociation RGA experiments. For the PSMBE technique, the most important growth parameters are the flux levels (as determined by RF power and Ar/N ratio), and growth temperature. We present experimental work on AlN, InN, and InAlN grown on an AlN buffer layer deposited on sapphire (c), (r), and (a) plane substrates. The films are epitaxial with no phase segregation as shown by x-ray diffraction analysis. In-situ RHEED analysis was used to determine RHEED intensity oscillations, strain profiles, and coherence length profiles simultaneously. The results indicate a 2D-3D type's growth mode. Characterization of the (Al, In)-Nitrides film were performed by post growth techniques such as XRD, XPS, AFM, Optical (micro-Raman, photoluminescence, and UV-VIS- NIR-IR spectroscopy), and Electrical (Hall measurements). The results of the in-situ end ex-situ characterization of (Al, In)-Nitrides films by are presented in this work and confirmed high structural and optical qualities of (Al, In) - Nitride films.

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