

Growth of Group-III Nitrides for Displays

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The emergence of relatively high brightness GaN-based LEDs emitting in the blue and near-UV has encouraged their use in a variety of display applications. Further improvements in brightness and process yield, however, are necessary to realize broad commercialization. A long term issue has been the lack of a suitable substrate and thus the resulting heteroepitaxial growth on alternative substrates with significant lattice and thermal mismatch. This presentation will focus on the growth of GaN on a variety of substrates including sapphire, nearly lattice-matched LiGaO₂ and LiAlO₂, as well as growth on Si.

Display devices also require low cost, large area deposition of the group-III nitrides. It is well established that the design and operation of metalorganic chemical vapor deposition (MOCVD) reactors strongly influence film properties. To develop a realistic reactor model, accurate kinetic information for chemical reactions in the reactor is required. This presentation will also report on the homogenous decomposition kinetics of TMIn and TMGa. The decomposition of these species was followed using in situ Raman scattering measurements and the data were analyzed with a two-dimensional axisymmetric model. A growth mechanism will be proposed.