SESSION 10b: EPI CHARACTERIZATION AND OPTIMIZATION

Chairs: Andy Souzis, *II-VI, Inc.*
Barbara Landini, *Sumika Electronic Materials*

The session on Epi Characterization and Optimization is comprised of five papers which utilize a variety of *in-situ* and *ex-situ* characterization techniques to optimize epitaxial growth processes and materials characteristics, focused on improvements in device performance and/or manufacturing efficiencies. The first paper by Tyhach *et al.* from Raytheon compares the performance of GaN HEMTs and MMICs grown on diamond and SiC substrates. The influence of the two substrates on the DC, RF and thermal device performance is discussed in light of predictive models. The paper by Tanaka *et al.* at Hitachi introduces a rapid *ex-situ* materials test that measures the light response of buffer leakage current in GaN-based HEMT materials. The light response is related to trapping states which can ultimately affect current collapse in these device structures. The third paper by Shelton *et al.* at RFMD examines the optimization of rotation speed during MBE epitaxial growth to improve the resultant PHEMT materials characteristics. The within-run wafer-to-wafer variation in sheet resistance is improved by optimizing the rotation speed during the growth of specific device layers. The subsequent paper by Zhou *et al.* of Skyworks examines the pre-growth oxide desorption process during MBE growth of pHEMT materials as a means to reduce the device growth time. Optimizing the desorption process permits a reduction in the total buffer layer thickness needed to achieve the required device performance, increasing the overall epitaxial growth throughput. The final paper by Youngers *et al.* from Kopin describes the implementation of *in-situ* reflectance data system to optimize MOVPE growth in a high volume manufacturing environment. The use of the reflectance data permits more rapid detection and response to changes in the epitaxial growth environment, ultimately improving C_{pk} values for specific materials characteristics.