Abstract Submitted
for the MAR05 Meeting of
The American Physical Society

Microbeam HRXRD and Photoluminescence characterization of selective area grown (SAG) optoelectronic waveguide arrays A.A. SIRENKO, S. O'MALLEY, New Jersey Institute of Technology, A. KAZIMIROV, D.H. BILDERBACK, Cornell High Energy Synchrotron Source, Cornell University, Z.-H. CAI, B. LAI, APS Argonne National Laboratory, A. OUGAZZADEN, Metz University, France — We present microbeam high-resolution x-ray diffraction (HRXRD) and micro-Photoluminescence analysis of the InGaAlAs-based MQW ridge-waveguide arrays for monolithically integrated optoelectronic devices. Waveguide arrays have been produced by the MOVPE technique in the Selective Area Growth (SAG) regime with the waveguide width varied from 1.6 to 60 μm and the distance between the waveguides of 5 μm. Synchrotron Radiation-based HRXRD measurements with the angular resolution of 3 arcsec were carried out at CHESS (beamsize of 10 μm) and APS (beamsize of 0.35 μm). Strain, thickness, and composition variation in the active region of the ridge waveguides have been measured and compared for the regimes of the selective growth controlled by the gas-phase diffusion and surface migration of the metal-organic precursors from the masked regions. Strong contribution of the surface migration from the oxide mask into the SAG growth process has been observed for the waveguides with the width < 10 μm. Strain-induced relaxation effects in the active regions have been studied using micro-beam reciprocal space mapping analysis.

A.A. Sirenko
New Jersey Institute of Technology

Date submitted: 05 Dec 2004 Electronic form version 1.4