highly strained QW sample due to either presence of high defect/dislocation density or thermal escape of charge carriers the in case of a shallow QW. The indium content of 0.42 represents an onset for the 2D-3D growth transition for the InGaAs QWs grown under present conditions, which was supported by low-temperature PL, room-temperature SPS and HRXRD data. Various transitions seen in the SPS spectra were identified by solving the Schrödinger equation for one dimensional square potential well. [*Ref: T.K.Sharma et. al., J. Crystal Growth 298, 527, 2007*]

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L.13 : Studies on GaN and GaP nanostructures :

a. GaN nanostructures : A detailed study was carried out on nanotextured high density Mg-doped GaN and undoped GaN, using photoluminescence spectroscopy. Nanotextured high-density Mg-doped and undoped GaN were obtained using photo-electrochemical etching. Fig.L.13.1: SEM image of a nanotextured GaN. Interesting features are observed in the temperature dependent photo-luminescence (PL) studies of these nanotextured materials. First, the PL intensity of the excitonic emissions shows more than three orders of

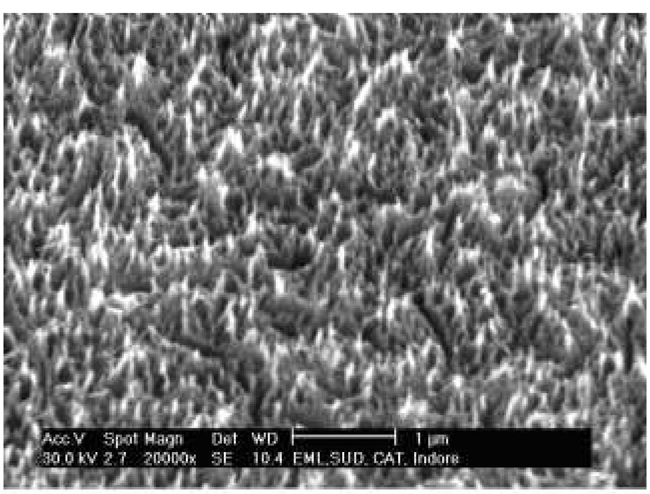

Fig.L.13.1: SEM image of a nanotextured GaN

magnitude enhancement. At low temperature, the peak energy shows a blue-shift with temperature. Second, the excitonic emissions in the nanotextured samples are red-shifted compared to the as-grown GaN suggesting strain relaxation. Third, the blue luminescence band (2.7 - 2.9 eV in Mg-doped GaN) shows a large red-shift, which is not consistent with strain relaxation calculated from excitonic band Furthermore, temperature dependence of the blue luminescence band energy shows an asymmetric S-shaped behavior in nanotextured GaN. All these observations are explained by invoking increase in carrier localization due to increase in potential fluctuation created by the nanotexturization process. [*Ref: S.Pal. et. al., J.Appl. Phys. 101, 044311, 2007*]

b. GaP nanostructures : Detailed studies were carried out on GaP wafer and nanoporous GaP network samples, using photoluminescence (PL) spectroscopy. SEM photograph of nanoporous GaP shown in Fig L. 13.2. Pore size is 140 ± 30nm with 44% porosity and the effective refractive index of these structure is ~ 1.50 ± 0.1. The PL signal is largely enhanced for band to band transition and a new luminescence is observed in visible and deep blue spectral range. The valence bands offset between porous GaP and GaO_x is found to be 2.30eV at room temperature. [*Ref: V.K.Dixit et al. Appl. Phys. Lett., 88, 083115, 2006*]

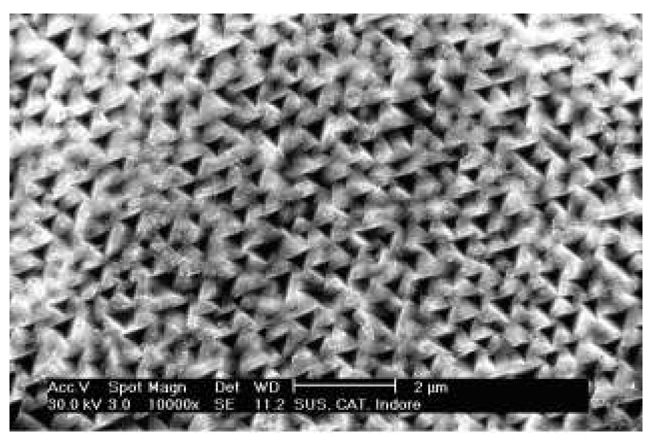

Fig.L.13.2: SEM photograph of nanoporous GaP

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