Low-temperature Photoluminescence of InAs Nanodots Synthesized in SiO_2/Si by Ion Implantation and Flash Lamp Annealing

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AIII-BV semiconductor nanocrystals are of great interest for both fundamental research and application in microelectronics. Their formation in Si-based matrices is an alternative route for integration of AIII-BV and Si technologies. For synthesis of such structures sequential ion implantation and annealing techniques can be used. In this work As^+ and In^+ ions were implanted into SiO_2(100nm)/Si. Flash Lamp Annealing (FLA) in the ms range with preheating was employed. For various annealing parameters (temperature and time) InAs nanocrystals of different sizes were obtained, including nanodots. We characterized the fabricated InAs nanostructures by low-temperature photoluminescence (PL) and micro-Raman spectroscopic techniques. The deconvoluted PL spectra obtained at temperatures in the range from 10K to 110K show a blue shift due to the quantum size effect. Using the PL spectra it has been possible to determine average InAs nanocrystalline sizes and compare with the XTEM experiment.