

PHOTOLUMINESCENCE AND AFM CHARACTERIZATION OF SILICON NANOCRYSTALS PREPARED BY LOW-TEMPERATURE PLASMA ENHANCED CHEMICAL VAPOUR DEPOSITION AND ANNEALING

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Abstract

When studying quantum dots one of most important properties is the size of the band gap, and thus also their physical dimensions. We investigated these properties of silicon quantum dots created by means of plasma-enhanced chemical vapour deposition and annealing. For measuring the band gap size we performed measurements of photoluminescence for ten different samples and for measuring physical dimensions we used an atomic force microscope. The photoluminescence measurements indicated that the intensity of the emitted photons varied across the samples, but did not indicate any shift in peak wavelength between samples nor any time-dependence of the luminescence. Unfortunately, the density of quantum dots on the surface of the samples was so high that it was very difficult to distinguish single quantum dots and to accurately measure their sizes.