

실리콘 나노결정 형성 메카니즘 및 응용

이상렬

120-749 서울 서대문구 신촌동 연세대학교 공과대학 전기전자공학과

Formation mechanism and applications of Si nanocrystals

Sang Yeol Lee

Yonsei Univ. Sinchon-dong Seodaemun-gu Seoul (Seoul 120-749 Korea)

sylee@yonsei.ac.kr

Abstract

In these days, nanoscience and nanotechnology are attractive due to the possibility of breakthrough of science and engineering. In this presentation, the current trends and applications of nanotechnologies will be briefly mentioned.

For the applications of nanotechnologies to optoelectronics, nanocrystalline silicon will be studied focused on its size reduction and the change of physical properties related to nanotechnology and nanoscience, respectively. Two major models have been proposed to explain the mechanism of Si-based luminescence. One is based on the quantum confinement effect and the second on surface states. In this presentation, the optical properties from Si nanostructures embedded in SiO_x matrices have been studied depending on the deposition and annealing conditions. Also, possible emission mechanisms of Si nanocrystalline thin films fabricated by pulsed laser deposition (PLD) have been proposed. Photoluminescence has been observed around 430 nm and 580 nm at room temperature on nitrogen ambient-annealed Si thin films. Si nanocrystallites were observed to be 1~5 nm by TEM. The results indicate the origin of the peak around blue (430 nm) region could be related to a quantum confinement effect of Si nanocrystallites while the origin of yellow emission (580 nm) related to the radiative recombination centers due to defects.