

Application of the Phonon Confinement Model on the Optical Phonon Mode of Silicon Nanoparticles

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The Si-rich silicon oxide (SiO_x) thin films are prepared on silica substrates by low pressure chemical vapor deposition (LPCVD) method and by the physical vapor deposition method (PVD). In order to induce the phase separation to SiO_2 and Si nanostructures the samples are annealed at the temperatures 900-1100 °C. The phonon confinement model is used to calculate the effect of quantum confinement inside the silicon nanoparticle on the optical phonon mode Raman peak. The results are used to determine the size distribution of nanoparticles from the Raman spectrum. The effect of stress on the shift of the optical phonon mode Raman peak is also discussed.