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PROCEEDINGS PAPER

Optical properties of sputtered Ge films

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Paper Abstract

Five Ge films with thickness 250, 20, 10, 5 and 1 nm were sputter deposited on fused quartz substrates and annealed at 700 degree(s)C for 1 hour in vacuum. Optical properties of those films were measured using a spectroellipsometer and spectrophotometers. The thickest film was used to determine annealing condition and it can be regarded as the bulk. Dielectric constants were analyzed by the use of model dielectric function developed by Adachi (Jpn. J. Appl. Phys. 32 (1993) 3168). Thickness dependence was clearly observed. The thinnest Ge film was alternately deposited with SiO₂ layer. Thickness of the SiO₂ layer was changed accordingly 1, 2 and 5 nm to change the volume fraction of Ge. Comparing extinction spectra between measured and calculated using multilayer model as well as effective medium approximation, we found that optical properties in very thin Ge layer is quite different from that of the bulk, suggesting appearance of the quantum size effects.

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