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The influence of change in silane concentration and substrate temperature on optical properties of hydrogenated microcrystalline silicon films

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Résumé / Abstract

The influence of change in deposition conditions of silane concentration and substrate temperature on optical properties of hydrogenated microcrystalline silicon thin film samples prepared by Plasma Enhanced Chemical Vapor Deposition (PECVD) technique, are investigated. The crystalline volume fraction for the samples determined from Raman spectra are correlated with the silane concentration, substrate temperature, deposition rate, absorption coefficient, refractive index and optical energy gap. In addition, a decrease in crystalline volume fraction is found accompanied by a decrease in both dark and photo-conductivities. The values of optical parameters (refractive index and absorption coefficient) are calculated from the transmission spectra in the range 400-2500nm and then used to determine optical band energy gap and Urbach energy. All these values are fairly compared to those obtained by different techniques.

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