

# THE INFLUENCE OF DEPOSITION RATE ON MICROSTRUCTURE AND OPTICAL PROPERTIES OF THE Sn THIN LAYERS

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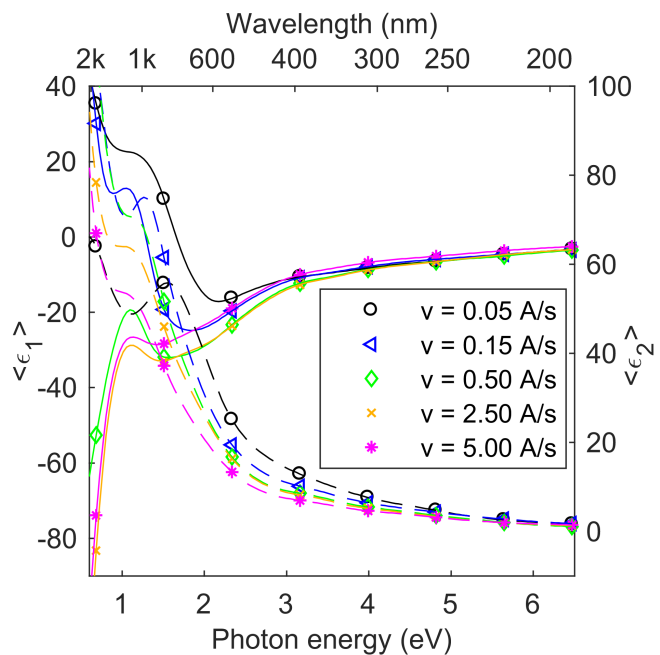
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The 30 nm - tin (Sn) layers were deposited on the Al<sub>2</sub>O<sub>3</sub> coated Si substrates using the physical vapor deposition (PVD) method. It was noticed that the microstructure and optical properties of thin films strongly depend on the deposition conditions (e.g. temperature, deposition rate). Therefore, the studied layers were prepared at five different deposition rates (0.05 A/s, 0.15 A/s, 0.50 A/s, 2.50 A/s, 5.00 A/s) at room temperature.

The AFM results show that the deposition rate has a major influence on the surface topography obtained of the Sn films. It was observed that the Sn layers prepared at deposition rates 2.50 Å/s and 5.00 Å/s are definitely less rough than Sn films grown at the deposition rates lower than 0.50 Å/s.

Changes in the microstructure of the Sn layer affect changes in their optical properties. This influence is clearly visible in the determined dielectric functions of the Sn films, which exhibit the largest differences for photon energies lower than 2.5 eV (see Fig.1.). This fact is associated with varied formation of metallic layers (their microstructure), thereby with different response of free electrons on the incident light and thus with different contribution of the Drude term to the complex dielectric function of the Sn layers.



**Fig.1.** Real part  $\langle \epsilon_1 \rangle$  (solid line) and imaginary part  $\langle \epsilon_2 \rangle$  (dashed line) of the effective complex dielectric function of Sn films.

**Keywords:** Sn thin layers; Microstructure; Optical properties