

INVESTIGATIONS ON NUCLEATION AND COALESCENCE IN THIN Sb-FILMS

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Abstract

Nucleation, coalescence, and the amorphous — crystalline phase transition in thin evaporated Sb-films show the following characteristic traits:

- below a well-known substrate temperature Sb condenses in the amorphous state;
- the velocity of the transition and the film structure after the phase transition depend strongly upon the deposition conditions;
- single crystal-like orientations may occur also on amorphous substrates.

Investigations on nucleation, cluster growth and coalescence were performed to describe the phase transition under different deposition conditions such as substrate temperature and deposition rate. To obtain statistically significant results about cluster size distributions and spatial distributions of clusters electronic image analysis of electron micrographs was carried out. Measurements of the condensation coefficient by quantitative X-ray microanalysis and Rutherford backscattering technique were possible.

Some mathematical models including shape factors and fractal dimensions were tested to describe the critical degree of cluster contact at which the phase transition occurs.