Modeling of metastable phase formation diagrams for sputtered thin films

Keke Chang

Materials Chemistry, RWTH Aachen University, Aachen
chang@mch.rwth-aachen.de

A method to model the metastable phase formation in the Cu–W system based on the critical surface diffusion distance has been developed. The driver for the formation of a second phase is the critical diffusion distance which is dependent on the solubility of W in Fcc-Cu and on the solubility of Cu in Bcc-W. Based on comparative theoretical and experimental data, we can describe the relationship between the solubilities and the critical diffusion distances in order to model the metastable phase formation. Metastable phase formation diagrams for Cu–W and Cu–V thin films are predicted and validated by combinatorial magnetron sputtering experiments.