

Journal of Applied Physics  
Volume 76, Issue 8, Pages 4576-4580, 1994  
American Institute of Physics

Real-Time Hot-Stage High-Voltage Transmission Electron Microscopy  
Precipitation of CdS Nanocrystals in Glasses: Experiment and Theoretical  
Analysis

Liu, Li-Chi; Subhash H. Risbud

Abstract

Hot-stage high-voltage (1.5 MeV) transmission electron microscopy was used to directly observe CdS nanocrystals precipitated in a silicate glass and a theoretical framework of nanocrystal coarsening kinetics more appropriate than the popularly used Lifshitz-Slyozov-Wagner theory was developed. Nanocrystallite nucleation and coarsening were monitored in situ by video taping of bright-field images of the edges of thin (less than 2  $\mu\text{m}$ ) glass fragments heated in the hot stage; crystallite size distribution was obtained from the taped experimental observations. The effects of electron-beam heating and diffusion out of the nanocrystals were included in developing the theoretical analysis of coarsening kinetics which were used, in turn, to interpret the experimental size distribution curves.