Αγγλική Περίληψη

Nanothermodynamics & non-extensive statistical mechanics: Theory & applications

The aim of the present thesis was the study of the entropy formulation of Tsallis in the context of non-extensive statistical thermodynamics and the fundamental works of Hill on thermodynamics of small systems (nanothermodynamics). A connection between these two branches of thermodynamics has been made through equilibrium probability distribution of the lateral size of Si nanocrystals which are an example of the completely open ensemble. Ultra-thin nanocrystalline silicon films with varying thickness from 5 to 30nm were grown on quartz by low pressure chemical vapor deposition (LPCVD) of Si. Observations on cross-sectional transmission electron microscopy (TEM) specimens revealed that the films had a columnar growth. The observed columnar growth gives the possibility to obtain two-dimensional nanocrystal arrays on quartz with well-defined size in the z-direction.