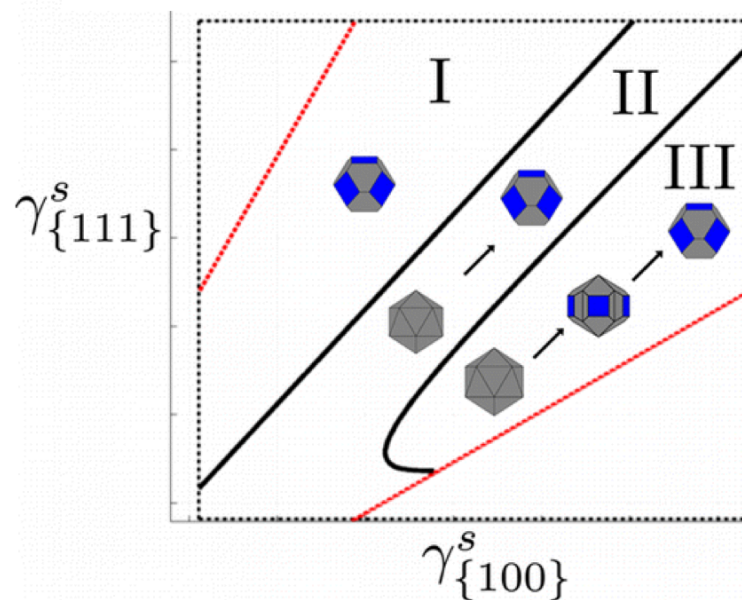


Thermodynamic Analysis of Multiply Twinned Particles: Surface Stress Effects

S. Patala, L. D. Marks, M. Olvera de la Cruz
Northwestern University Materials Research Science & Engineering Center

In order to take advantage of the enhanced functionality offered by the intrinsically strained multiply-twinned nanoparticles, a precise control on the yield and morphology of these structures is essential. By combining the numerical finite element method with the thermodynamic stability analysis of MTPs, it was observed that higher surface stresses result in an increased likelihood of obtaining Icosahedral nanoparticles and lower surface stresses stabilize the formation of Decahedral morphologies. The surface stress factor is proposed as a design parameter, during solution synthesis, for controlling the morphology of these multiply-twinned nanostructures.



A typical stability map for icosahedral and decahedral nanoparticles with varying unstrained surface energies

