Using the Binary Phase-Field Crystal Model to Describe Non-Classical Nucleation Pathways in Gold Nanoparticles

NATHAN SMITH, NIKOLAS PROVATAS, McGill University - Department of Physics — Recent experimental work [Loh et al, Nature Chemistry, Vol 9, 2017] has shown that gold nanoparticles can precipitate from an aqueous solution through a non-classical, multi-step nucleation process. This multi-step process begins with spinodal decomposition into solute-rich and solute-poor liquid domains followed by nucleation from within the solute-rich domains. We present a binary phase-field crystal theory that shows the same phenomenology and examine various crossover regimes in the growth and coarsening of liquid and solid domains.

1We’d like to thank Canada Research Chairs (CRC) program for funding this work.