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Theoretical, Computational, and Experimental studies of Phase Coarsening

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Understanding the precise and fundamental manner in which materials structures (nanostructures or microstructures) formation and their evolution influences properties and service lifetimes of advanced materials profoundly impacts material design, and today materials design plays an increasingly important rôle in many engineering applications. Phase coarsening occurs in the process of microstructure evolution in different materials.

In this talk, first, I will present the phenomena on nucleation, growth, and phase coarsening in different alloys such as superalloys. Then I will present different theoretical, computational, and experimental studies of phase coarsening in different alloys including Ni-based superalloys. Finally, I will show you the advantage and limitations for different methods and one unified microstructural evolution modeling.

Our theoretical and computational tools are sufficiently reliable to permit control and fabrication of quantum-dots structures, nanocrystals, and particle-reinforced nanocomposites, as well as assist in the predictive behavior of nano-scale colloids, aerosols, foams, and other soft matter systems.

Related publications:

1. K. G. Wang and M. E. Glicksman, Chapter 5, ``Ostwald Ripening in Materials Processing," *Processing Handbook*, edited by J. Groza et al, CRC Press (2007).
2. K. G. Wang, et al. "Modeling and Simulation of Phase Coarsening: a Comparison with Experiment," Phys. Rev. E. Vol. 69, 061507 (2004).
3. K. G. Wang, et al. ``Correlations and fluctuations in phase coarsening," Phys. Rev. E, Vol. 73, 061502 (2006).
4. K. G. Wang, ``Unified Model Equations for Microstructure Evolution," Physica A, Vol. 387, 3084 (2008)
5. K. G. Wang, et al. "Locale Noise in Late-stage Coarsening", Phys. Rev. E. Vol.68, 051501 (2003)

Lundi 23 Juin 2008 à 10h30

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