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Nota di contenuto	Chapter 1. Introduction to kinetics in nanoscale materials -- 1.1 Introduction -- 1.2 Nanosphere: Surface energy equivalent to the Gibbs-Thomson potential -- 1.3 Nanosphere: Lower melting point -- 1.4 Nanosphere: Effect on homogeneous nucleation and phase diagram -- 1.5 Nanosphere: The Kirkendall effect and instability of hollow nanospheres -- 1.6 Nanosphere: The inverse Kirkendall effect in hollow alloy nanospheres -- 1.7 Nanosphere: Combining the Kirkendall effect and inverse Kirkendall effect on concentric bi-layer hollow nanospheres -- 1.8 Nanopore: Instability of a nanodonut hole in a membrane -- 1.9 Nanowire: Point contact reactions between metal and silicon nanowires -- 1.10 Nanowire: Nano gap in silicon nanowires -- 1.11 Nanowire: Lithiation in silicon nanowires -- 1.12 Nanowire: Point contact reactions between metallic nanowires -- 1.13 Nano-thin film: Explosive reaction in periodic multi-layered nano-thin films -- 1.14 Nano-microstructure in bulk sample: Nanotwins in Cu -- 1.15 Nano-microstructure on the surface of a bulk sample : surface mechanical attrition treatment (SMAT) of steel -- Chapter 2. Linear and Non-linear

Diffusion -- 2.1 Introduction -- 2.2 Linear diffusion -- 2.3 Non-linear diffusion -- 2.3.1 Non-linear effect due to kinetic consideration -- Chapter 3. Kirkendall effect and inverse Kirkendall effect -- 3.1 Introduction -- 3.2 Kirkendall effect -- 3.3 Inverse Kirkendall effect -- Chapter 4. Ripening among nano precipitates -- 4.1 Introduction -- 4.2 Ham's model of growth of a large spherical precipitate -- 4.3 Mean field consideration -- 4.4 Gibbs-Thomson potential -- 4.5 Growth and dissolution of a spherical nano precipitate in a mean field -- 4.6 LSW Theory of kinetics of particle ripening -- 4.7 Continuity equation in size space -- 4.8 Size distribution function in conservative ripening -- Chapter 5. Spinodal decomposition -- 5.1 Introduction -- 5.2 Implication of diffusion equation in homogenization and in decomposition -- 5.3 Spinodal decompostion -- Chapter 6. Nucleation events in bulk materials, thin films, and nano-wires -- 6.1 Introduction -- 6.2 Thermodynamics and kinetics of nucleation -- 6.3 Heterogeneous nucleation in grain boundaries of bulk materials -- 6.4 No homogeneous nucleation in epitaxial growth of Si thin film on Si wafer -- Chapter 7. Contact reactions on Si; plane, line, and point contact reactions -- 7.1 Introduction -- 7.2 Bulk cases -- 7.3 Thin film cases -- 7.4 Nanowire cases -- Chapter 8. Grain growth in micro and nano scale -- 8.1 Introduction -- 8.2 Computer simulation to generate a 2D polycrystalline microstructure -- 8.3 Computer simulation of grain growth -- 8.4 Statistical distribution functions of grain size -- 8.5 Deterministic approach to grain growth modeling -- 8.6 Coupling between grain growth of a central grain and the rest of grains 8.7 Decoupling the grain growth of a central grain from the rest of grains in the normalized size space -- 8.8 Grain growth in 2D case in the normalized size space -- 8.9 Grain rotation of nano-grains -- Chapter 9. Self-sustained reactions in nanoscale multi-layered thin films -- 9.1 Introduction -- 9.2 The selection of a pair of metallic thin films for self-sustained reaction -- 9.3 A simple model of single-phase growth in self-sustained reaction -- 9.4 Estimate of flame velocity in steady state heat transfer -- 9.5 Comparison between reactions by annealing and by explosive reaction in Al/Ni -- 9.6 Self-explosive silicidation reactions -- Chapter 10. Formation and transformations of nano-twins in copper -- 10.1 Introduction -- 10.2 Formation of nano-twins in Cu -- 10.2.1 First principle calculation of energy of formation of nano-twins -- 10.3 Formation and transformation of oriented nano-twins in Cu -- 10.4 Potential applications of nano-twinned Cu References -- Appendix A: Laplace pressure of nano-cubic particles -- Appendix B: Derivation of interdiffusion coefficient as CMG -- Appendix C: Non-equilibrium vacancies -- Appendix D: Interaction between Kirkendall effect and Gibbs-Thomson effect in the formation of a spherical compound nanoshell.

Sommario/riassunto

"As the ability to produce nanomaterials advances, it becomes more important to understand how the energy of the atoms in these materials is affected by their reduced dimensions. Written by an acclaimed author team, Kinetics in Nanoscale Materials is the first book to discuss simple but effective models of the systems and processes that have recently been discovered. The text, for researchers and graduate students, combines the novelty of nanoscale processes and systems with the transparency of mathematical models and generality of basic ideas relating to nanoscience and nanotechnology"--