This lecture reviews generalized grain growth phenomena, paying particular attention to results obtained with nanostructured metals. Results related to the influence of deformation rate on grain morphology and dislocation substructures are presented and discussed. The influence of fatigue deformation is described as the structure evolves from one size regime to the other. Finally, we report on a study of stress-induced grain growth phenomena in the presence of second-phase particles and solute/impurity segregation at grain boundaries (GBs) during high-temperature deformation of ultra-fine grained (UFG) materials. Results are analyzed for an Al alloy synthesized via consolidation of mechanically milled powders. The mechanisms underlying stress-induced grain growth were identified as GB migration and grain rotation, which were accompanied by dynamic recovery and geometric dynamic recrystallization, while discontinuous dynamic recrystallization was not operative. A theoretical framework that incorporates the effect of second-phase particles and solute/impurity segregation at GBs on stress-induced grain growth is formulated and discussed. The experimentally determined stress-induced grain growth results are rationalized using the proposed theoretical framework.

Furthermore, the effect of second-phase particles and solute/impurity segregation at GBs on GB migration and grain rotation was quantified using the model, indicating that both second-phase particles and solutes/impurities segregated GBs reduce the velocities of GB migration and grain rotation as compared to those in commercially pure Al.