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Preparing a texture suitable for a given purpose is a central problem in materials science, which presents many challenges for mathematical modeling, simulation, and analysis. We focus on the mesoscopic behavior of the grain boundary system and on understanding the role of topological reconfigurations during evolution. We formulate several types of evolution equations based on fractional kinetics and stochastic descriptions, compare its results with the simulations and discuss their limitations and possible extensions to higher dimensions. (Received September 27, 2006)