

Sintering Hazards - A Non-Steady-State Approach to Kinetics

Thursday, 3 September 2026 09:00 (30 minutes)

In situ TEM based sintering experiments indicate that sintering kinetics are inherently non-steady-state due to the need to nucleate point defect sinks. In materials science, kinetic laws are typically derived from differential equations describing the relationship between instantaneous rate and driving force. These formulations are not adequate for problems that are inherently non-steady-state, exhibit hysteresis, and stochasticity. To address this problem, we invoke lifetime and hazard analysis, which is better suited for such problems. We demonstrate that this analysis enables the formulation of a closed form kinetic equation that converges (i) on Coble's equation when the hazard is large, (ii) on a nucleation rate limited model when the hazard is low, and (iii) the sink-controlled regime first derived by Ashby et al for intermediate hazards. This provides a basis for predicting the general sintering response across all rate controlling mechanisms.

Professional Status of the Speaker

Senior Scientist

Interest in submitting a paper in a special issue of

Journal of the European Ceramic Society (Elsevier)

Invitation letter for visa

No

Author: DILLON, Shen (University of California Irvine)

Presenter: DILLON, Shen (University of California Irvine)

Session Classification: Fundamental aspects of sintering

Track Classification: Group 1: Fundamental aspects of sintering