

# Phase-field Simulation for Advanced Sintering

Advanced sintering techniques, distinguished from traditional methods by implementing treatments beyond heat or pressure, have recently gained attention for their efficiency, rapid heating/cooling capabilities, and precise shaping capabilities. The phase-field model has demonstrated its effectiveness in elucidating the in-process evolution of complex structures, taking into account factors such as heat conduction and surface melting. Nonetheless, as a type of diffuse-interface approach, these models utilize a finite interface width to represent transient microstructures. To ensure their quantitative accuracy, they must be asymptotically aligned with their corresponding sharp-interface equations.

In this presentation, we introduce the phase-field framework in advanced sintering considering the existence of local temperature field. We incorporate the Onsager phenomenological relations for non-equilibrium processes directly into the development of our non-isothermal phase-field model. This inclusion introduces additional kinetic terms that elucidate the interplay between mass and heat transfer as well as grain growth. Moreover, we have integrated aspects such as trapping effects and surface diffusion into the variational framework. Our phase-field sintering models have been applied to various advanced sintering techniques, encompassing selective laser sintering, field-assisted sintering, and blacklight sintering.

## Professional Status of the Speaker

Postdoc

## Interest in submitting a paper in a special issue of

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## Invitation letter for visa

No

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