Contribution ID: **45** Type: **2. Invited speaker (by invitation only)**

Last advances in Discrete Element Simulation of sintering

In this presentation, we will review the last advances in discrete element simulations of sintering processes. We present a free in-house code, dp3D, which can tackle the different processes related to powder metallurgy from compaction to sintering. dp3D introduces a coupling between densification and grain-growth. The simplifying assumptions and the limitations of the model are discussed together with the conditions necessary for the initiation of each mechanism (surface diffusion and grain boundary migration).
We apply this model to study the effect of particle size distribution on grain growth. We show that wider distribution results in earlier grain growth. We use our simulations to explore the reasons for the suppression of grain growth in the two-step sintering of alumina.
In dp3D, the standard assumption (reasonable for a large set of practical problems) is that particles are spherical and become indented spheres with densification. We have developed a Level-Set module that allows for non-spherical particles. We apply this model to elliptical particles and show that departure from spherical particles may have beneficial effects.
Finally, we show an application on Metal Binder Jetting where simulations reproduce the heterogeneities at the interface between two deposited layers as an input (from X-ray tomography). The resulting sintering anisotropic behavior is discussed together with the type of information provided at the particle scale and at the macroscopic scale.

Professional Status of the Speaker

Senior Scientist

Interest in submitting a paper in a special issue of

No interest

Invitation letter for visa

No

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Session Classification: Modelling and simulation of sintering at multiple scales

Track Classification: Group 1: Modelling and simulation of sintering at multiple scales