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Simulation of current-activated pressure-assisted densification¹ DIETRICH WOLF, SEBASTIAN ANGST, GABI SCHIERNING, University of Duisburg-Essen — Cohesive particles usually form very porous agglomerates. They support loads up to a consolidation pressure, which increases with decreasing particle size. Compaction of nano-powders can therefore be very costly and time consuming. If the particles are electrically conducting, which is the case e.g. for novel nano-structured thermoelectric materials, the technique of current-activated pressure-assisted densification (CAPAD) turns out to have many advantages. Electrical power deposited locally as Joule heat lowers the consolidation pressure such that particles fill nearby pores. This process leads to fast, scalable densification without much coarsening. Simulations are presented which address the influence of correlations on density and conductivity [1]. They also take thermal conductivity and Peltier coefficient into account [2].

[1] S. Hartner et al. in: Nanoparticles from the Gasphase - Formation, Structure, Properties. A. Lorke, M. Winterer, R. Schmechel, Ch. Schulz (eds.) (Springer, Berlin 2012) pp. 231 - 270.

[2] A. Becker et al., Appl. Phys. Lett. 101, 013113 (2012).

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