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Development of a Simple Sintering Law for Fractal Aggregates Composed of Unequal Sized Primary Particles[1] TAKUMI HAWA, MICHAEL ZACHARIAH, University of Maryland and National Institute of Standards and Technology — Sintering of silicon nanoparticle chain aggregates composed of unequal sized primary particles are investigated using molecular dynamics (MD) simulations at 1500 K. We consider straight chain aggregates consisting of up to 40 2.5 and 5.4 nm primary particles. The sintering time increases with increase in the total volume of the chain aggregate or with increase in the exposed initial surface area of the chain. A mathematical model was developed to describe the dynamics of sintering of such chain aggregates. The model is a power law modification of the Frenkel sintering equation with the Koch-Friedlander model to include primary particle size dependence. We found that the particle size effect is a local process, and important only at the initial stage of the sintering. Thus, the effect is not significant when the aggregate becomes large. The model is amenable for use in aerosol models that might include sintering effects.

[1]NSF, AHPCRC

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