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Quantification of Aggregate Topology, the Minimum Dimension and Connectivity DURGESH RAI, GREGORY BEAUCAGE, University of Cincinnati, JAN ILAVSKY, Argonne National Laboratory, HENDRIK KAMMLER, Clariant Corporation — The properties (electrical conductivity, diffusion coefficient, spring constant) of nanostructured ceramic aggregates can be determined only if details of the structural topology are known. For example, the mechanical strength of an aggregate depends only on the shortest average path through the aggregate, called the minimum path. Most characterization methods fail to quantify the topology. Values of the minimum dimension, associated with the minimum path, and the spectral dimension, associated with energy distribution in an aggregate have been considered only in simulations and models. Recently we have developed a method using small-angle neutron and x-ray scattering for the quantification of the details of topology in aggregated materials (Beaucage 2004, Ramachandran 2008, 2009). In situ SAXS studies of flame aerosols containing nanostructured aggregates will be presented. Their topology as a function of growth time on the millisecond time scale will be described. Beaucage G, *Phys. Rev. E* **70** 031401 (2004).; Ramachandran R, et al. *Macromolecules* **41** 9802-9806 (2008).; Ramachandran R, et al. *Macromolecules*, **42** 4746-4750 (2009).

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