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**Small Angle Light Scattering Studies of Gelation in Flame Soot Aerosols.** C.M. Sorensen, W. Kim, D. Fry, F. Pierce, A. Chakrabarti, Dept. of Physics, Kansas State Univ., Manhattan, KS 66506.

When solid particles in either an aerosol or a colloid aggregate they form fractal clusters with, typically, a fractal dimension of D=1.8. Since the aggregate fractal dimension is less than the spatial dimension, the relative size to separation ratio decreases during aggregation until the clusters percolate to form a gel. Using small angle light scattering, direct visual observation and computer simulations, we find that these large structures have a superaggregate morphology, i.e., a fractal dimension of D=2.6 on large length scales, composed of smaller aggregates with a fractal dimension of 1.8 [1-3].

The small angle light scattering experiments, $0.1 \leq \theta \leq 15$ degrees, were performed in situ on diffusion flames of heavily sooting fuels, e.g., acetylene. The superaggregate, D = 2.6 structure occurs over length scales of ca. one to ten microns, whereas DCLA structure with D=1.8 occurs for submicron length scales. Less sooty fuels show only the submicron, D = 1.8 aggregates. These superaggregate structures evolve further in the flame to create gel networks [4].

[1]C.M. Sorensen, *et al.*, *Langmuir* 19, 7560 (2003).
[2]W. Kim, *et al.*, *Langmuir* 20, 3969 (2004).
[3]D. Fry, *et al.*, *Phys. Rev.* E 69, 061401 (2004).
[4]C.M. Sorensen, *et al.*, *Phys. Rev. Lett.* 80, 1782 (1998).