Abstract Submitted
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Branch Content in Hybrid Materials using Small-Angle Scattering[1] GREG BEAUCAGE, University of Cincinnati — Inorganic/organic hybrid materials often display ramified mass- fractal structures characterized by primary particle size, aggregate size, and mass-fractal dimension. Physical properties, such as mechanical and dynamic mechanical properties and electrical conductivity (in carbon composites for instance), can not be predicted using only these structural features since such properties are intimately tied to the degree and type of branching as shown by Witten [1]. Witten suggested the use of the minimum dimension, or the related connectivity dimension, to calculate mechanical response in these hybrid systems. A viable technique to quantify the minimum dimension and connectivity dimension in hybrid materials has, until recently, been absent from the literature. This presentation will discuss the use of small-angle x-ray and neutron scattering to describe branch content in hybrid materials [2] and will outline an approach to use the minimum dimension and connectivity dimension to predict static and dynamic mechanical properties for hybrid materials based on structure [1, 3]. 1. Witten TA, Rubinstein M, Colby RH Reinforcement of Rubber by Fractal Aggregates J Phys II 3 (3): 367-383 (1993). 2. Beaucage G Determination of branch fraction and minimum dimension of mass-fractal aggregates Phys Rev E 70 (3): art. no. 031401 Part 1 (2004). 3. Kohls DJ, Beaucage G Rational design of reinforced rubber Curr Opin Solid St M 6 (3): 183-194 (2002).

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Greg Beaucage
University of Cincinnati

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