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Investigating the Microstructure of Carbopol by Light Scattering

DAVID LEE, Department of Physics, Simon Fraser University, ARTHUR BAILEY, Scitech Instruments Inc., BARBARA FRISKEN, Department of Physics, Simon Fraser University — Carbopol, a family of cross-linked acrylic acid-based polymers and a well-known thickener used in personal care, household and industrial products, is often used as a model yield-stress fluid because it is transparent and its rheological properties can be precisely tuned by sample preparation conditions. Carbopol dispersions behave as an elastic solid but they will flow when the applied stress exceeds a sample-dependent yield value. Both the yield stress phenomena and the range of potential applications recommend study of the microscopic structure and properties of yield stress fluids as this will lead to a fundamental understanding of this behaviour. Light scattering experiments investigating Carbopol ETD2050 dispersed in water have revealed that the Carbopol microstructure consists of a highly cross-linked inner region surrounded by a lightly cross-linked outer region. Experiments also show that the length scales and mass fractal dimension depend on the sample concentration and pH.

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