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“COMPLEX SOFT NANOSTRUCTURED PARTICLE SHAPES FROM SIMPLE EMULSION DROPLET ORIGINS”

The last several decades have seen great achievements in the design, synthesis, and fabrication of colloidal particles. It is now possible to produce monodisperse colloids with complex shapes and surface properties in relatively significant quantities. One logical next step to such breakthroughs is to begin making particles whose unique shapes and surfaces provide some unique benefit. However, in many disciplines our ability to design and produce custom colloids has outpaced our ability to specify what properties will most enhance a given application.

Here we couple microfluidic production of droplets with molecular self-assembly mechanisms to produce a range of liquid crystalline nano- and microparticle shapes with well-controlled symmetry. The molecular interactions driving formation of a range of crystalline structures, in both cubosomes and hexosomes, are shown to be a useful toolkit for creating even more complex shapes via control and exploitation of the particles’ rheology. Templating of these soft shapes to form more resilient solid forms will also be demonstrated. More broadly, this talk will discuss possible applications of these particles to enhance delivery and retention, respond to environmental changes, and mimic biological functions. Ultimately we seek to optimize these shapes for various uses while still enabling large-scale production.

BIOGRAPHY

PATRICK SPICER is an Associate Professor in the School of Chemical Engineering at the University of New South Wales (UNSW) in Australia. His research interests include complex fluids, microrheology, and novel emulsions. Before moving to academia, Pat led the Procter & Gamble Company’s Microstructured Fluids Group for 15 years. He earned a BS from the University of Delaware and a PhD from the University of Cincinnati, both in chemical engineering.

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http://nonequilibrium.com/