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Capillary foams: highly stable bubbles formed by synergistic action of particles and immiscible liquid CARSON MEREDITH, YI ZHANG, SVEN BEHRENS, Georgia Tech — Liquid foams are a familiar part of everyday life from beer and frothed milk to bubble baths; they also play important roles in enhanced oil recovery, lightweight packaging, and insulation. We report a new class of foams, obtained by frothing a suspension of colloidal particles in the presence of a small amount of an immiscible secondary liquid. A unique aspect of the new foams, termed capillary foams, is that suspended particles mediate spreading of a minority liquid around gas bubbles. The resulting mixed particle/liquid coating can stabilize bubbles against coalescence even when the particles alone cannot. We demonstrate the generality of capillary foams by forming them from a diverse set of particle/liquid combinations and rationalize the results with a simple free energy model. In addition to many applications as liquid foams, capillary foams can serve as precursors for hierarchically-structured solids with porosity on different length scales and with significant application potential.

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