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Strain-stiffening response in organogels assembled using steroidal biomolecules SHIH-HUANG TUNG, SRINIVASA R. RAGHAVAN, University of Maryland, College Park — The phenomenon of strain-stiffening or strain-hardening refers to an increase in the elastic modulus (stiffness) of a material with increasing strain amplitude. While this response is exhibited by many biological materials, including gels of biopolymers such as actin, it is rarely seen in other types of soft matter. Here, we report strain-stiffening in a new class of self- assembled organogels being studied in our laboratory. These gels are formed in nonpolar organic liquids by combining a lipid (lecithin) or two-tailed surfactant (AOT) with a type of naturally occurring steroidal amphiphile called a bile salt. Based on rheological and scattering data, we deduce that the gel structure comprises a network of semiflexible filaments. Interestingly, gels induced by small organic molecules other than bile salts do not show strain-stiffening. We suggest that the bile salt molecules confer an intrinsic stiffness to the filaments in the gel, which is important for strain-stiffening.

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