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Capillary break-up, gelation and extensional rheology of hydrophobically modified cellulose ethers VIVEK SHARMA, SIMON HAWARD, Massachusetts Institute of Technology, OLIVIA PESSINET, Ecole des Mines, ASA SODERLUND, PHIL THRELFALL-HOLMES, AkzoNobel, GARETH MCKINLEY, Massachusetts Institute of Technology — Cellulose derivatives containing associating hydrophobic groups along their hydrophilic polysaccharide backbone are used extensively in the formulations for inks, water-borne paints, food, nasal sprays, cosmetics, insecticides, fertilizers and bio-assays to control the rheology and processing behavior of multi-component dispersions. These complex dispersions are processed and used over a broad range of shear and extensional rates. The presence of hydrophobic stickers influences the linear and nonlinear rheology of cellulose ether solutions. In this talk, we systematically contrast the difference in the shear and extensional rheology of a cellulose ether: ethy-hydroxyethyl-cellulose (EHEC) and its hydrophobically-modified analog (HMEHEC) using microfluidic shear rheometry at deformation rates up to 10^6 inverse seconds, cross-slot flow extensional rheometry and capillary break-up during jetting as a rheometric technique. Additionally, we provide a constitutive model based on fractional calculus to describe the physical gelation in HMEHEC solutions.

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