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Branching mechanisms in surfactant micelles.[1] SUBAS DHAKAL, Department of Biomedical and Chemical Engineering, Syracuse University, Syracuse, NY, RADHAKRISHNA SURESHKUMAR, Department of Biomedical and Chemical Engineering and Department of Physics, Syracuse University, Syracuse, NY — The mechanisms of branch formation in surfactant micelles of cetyltrimethylammonium chloride (CTAC) in presence of sodium salicylate (NaSal) counter ions in water are studied using molecular dynamics simulations. The curvature energy associated with the formation of micelle branches and the effect of branching on the solution viscosity are quantified. Highly curved surfaces are energetically stabilized by a higher density of binding counter ions near the branch points. Simulations show that micellar branches result in a significant reduction in the solution viscosity as observed in experiments [Dhakal & Sureshkumar, J. Chem. Phys. 143, 024905 (2015)]. This reduction in viscosity has long been attributed to the sliding motion of micelle branches across the main chain. However, to date, such dynamics of micelle branches have never been visualized in either experiments or simulations. Here, we explicitly illustrate and quantify, for the first time, how branches slide along the micelle contour to facilitate stress relaxation.

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