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Irreversible gelation of wormlike micelle solutions under microfluidic flow PERRY CHEUNG, JOSHUA CARDIEL, NEVILLE DUBASH, AMY SHEN, University of Washington — The formation of flow-induced gel-like structures in surfactant solutions containing wormlike micelles have previously been observed in macroscopic flow under applied shear in dilute solutions of cetyl-trimethylammonium bromide (CTAB) and sodium salicylate (NaSal). However, the observed gelation phase transition is short-lived once the applied flow is stopped and reversibly disappears. Recently, irreversible gelation was achieved by applying high shear and extensional flows within a packed bed of microbeads in a microfluidic device [1]. We present here a further investigation of the irreversible flow-induced gelation of dilute solutions of CTAB/NaSal in microfluidic devices with microfabricated arrays of microposts with varying post diameters and inter-post spacing. The onset of gelation at various surfactant concentrations and flow rates (both shear and extension rates) will be examined to determine the extent of this phenomenon.

[1] Vasudevan, M., et al., Irreversible nanogel formation in surfactant solutions by microporous flow. Nat Mater, 2010. 9(5): p. 436-441.

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