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Photolithography and Fluorescence Correlation Spectroscopy used to examine the rates of exchange in reverse micelle systems .[1] ZACH NORRIS, CARA MAWSON, KYRON JOHNSON, SARAH KESSLER, ANNE REBECCA, NATHAN WOLF, MICHAEL LIM, NATHANIEL NUCCI, Rowan University — Reverse micelles are molecular complexes that encapsulate a nanoscale pool of water in a surfactant shell dissolved in non-polar solvent. These complexes have a wide range of applications, and in all cases, the degree to which reverse micelles (RM) exchange their contents is relevant for their use. Despite its importance, this aspect of RM behavior is poorly understood. Photolithography is employed here to create micro and nano scale fluidic systems in which mixing rates can be precisely measured using fluorescence correlation spectroscopy (FCS). Micro-channel patterns are etched using reactive ion etching process into a layer of silicon dioxide on crystalline silicon substrates. Solutions containing mixtures of reverse micelles, proteins, and fluorophores are placed into reservoirs in the patterns, while diffusion and exchange between RMs is monitored using a FCS system built from a modified confocal Raman spectrometer. Using this approach, the diffusion and exchange rates for RM systems are measured as a function of the components of the RM mixture.

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