

604a Dynamic Assembly in Nanochannels Manipulated by Electrokinetics

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Nanoscale polymer silica hybrid nanochannels of average channel size of ~50 nm are fabricated by electrokinetically induced silicification reaction within a polymer template. The uniform growth of silica can be realized by appropriate combination of reactant concentration and electric field strength. The formed silica leads to the reduction in channel size, and provides substantial reinforcement to the polymer nanostructure. Experiments are carried out in nanochannels with different geometries (i.e., converging/diverging and straight channels). Analog 2D devices are also constructed to visualize and study the mechanism of the dynamic assembly process. In addition, simulation results are also carried out in these 2D nanochannels and comparisons are made to experimental results in some cases. Such nanochannel arrays may be a useful platform for a variety of nanofluidic systems and biomedical applications.