Abstract Submitted
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Numerical simulations of electric field driven hierarchical self-assembly of monolayers of binary mixtures of particles[1] EDISON AMAH, NAGA MUSUNURI, SHAHADAT HOSSAIN, IAN FISCHER, PUSHPENDRA SINGH, New Jersey Institute of Technology — We numerically study the process of self-assembly of particle mixtures on fluid-liquid interfaces when an electric field is applied in the direction normal to the interface. Lateral forces cause particles to self-assemble into molecular-like hierarchical arrangements consisting of composite particles arranged in a pattern. As in experiments, if the particles sizes differ by a factor of two or more, the composite particle has a larger particle at its core with several smaller particles forming a ring around it. Approximately same sized particles form chains (analogous to polymeric molecules) in which positively and negatively polarized particles alternate when their concentrations are approximately equal, but when their concentrations differ substantially the particles whose concentration is larger form rings around the particles whose concentration is smaller. In some instances, particle chains with a positively polarized particle at one end and a negatively particle at the other folded to form circular chains. For submicron particles, only when the electric field intensity is larger than a critical value required for overcoming Brownian forces, a hierarchical pattern consisting of composite particles will form.

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