Abstract Submitted
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Colloidal band assembly from different suspended particles[1] ANDREW YEE, MINAMI YODA, Georgia Institute of Technology — Particle visualizations, mainly based on evanescent-wave illumination, have shown that sulfate- and carboxylate-terminated polystyrene particles in a dilute suspension flowing through a microchannel assemble into near-wall bands when the flow is driven by a dc electric field and a pressure gradient along the channel axis applied in opposite directions. In these bands, the colloidal particles (of radius $a \approx 250 - 500$ nm) are concentrated in a liquid state in regions with a cross-sectional dimension of a few μm and an axial extent comparable to the channel length of $O(1$ cm$)$. In many cases, the particles first assemble into many closely spaced, fairly unstable bands before achieving a fairly stable "steady-state" configuration with fewer bands. Results at a given channel location for the timescales of particle assembly as well as the characteristics of the bands are presented for a range of particle and suspension properties including the particle volume fraction φ_∞, a, and particle zeta-potential ζ_p and flow properties such as the electric field magnitude $|E|$ and near-wall shear rate $\dot{\gamma}$. The band characteristics appear to scale with the electric field "offset," or $|E| - |E_\mathrm{min}|$ where $|E_\mathrm{min}|$ is the minimum electric field magnitude at a given $\dot{\gamma}$ required for band formation.

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