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Control of colloid transport via solute gradients in dead-end channels SANGWOO SHIN, EUJIN UM, Princeton University, PATRICK WARREN, Unilever R&D Port Sunlight, HOWARD STONE, Princeton University — Transport of colloids in dead-end channels is involved in widespread applications ranging from drug delivery to geophysical flows. In such geometries, Brownian motion may be considered as the sole mechanism that enables transport of colloidal particles into or out of the channels, which is, unfortunately, an extremely inefficient transport mechanism for microscale particles. Here, we explore the possibility of diffusiophoresis as a means to control the colloid transport by introducing a solute gradient along the dead-end channels. We demonstrate that the transport of colloidal particles into the dead-end channels can be either enhanced or completely prevented via diffusiophoresis. We also observe a size-dependent focusing of the particles where, as the particle size increases, the particles tend to concentrate more, and they tend to reside deeper in the channel. Our findings have implications for all manners of controlled release processes, especially for site-specific drug delivery systems where localized targeting of drugs with minimal dispersion to the non-target is essential.

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