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The clogging cascade of an array of microchannels ERIN BARNEY, EMILIE DRESSAIRE, Trinity College, HOWARD STONE, Princeton University — The manipulation and filtration of dilute suspensions of microparticles are important processes for both natural and engineered systems. Relying on the comparable lengthscales of the microchannels and microparticles, these systems are particularly susceptible to blockage. Studies at the single-pore level have established that the clogging of a microchannel is controlled by colloidal and hydrodynamic interactions. However, clogging is a multiscale process; the formation of single-pore level clogs often results in the blockage of a macroscopic system. The dynamics of this series of clogging events or clogging cascade are studied here. We investigate the blockage of an array of parallel microchannels and show in particular, that the rate of clog formation decreases during the clogging cascade. Through experimental measurements and theoretical analysis, we demonstrate the roles of colloidal and hydrodynamic effects in the dynamics of the clogging cascade.

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