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The Clogging Behavior of Tapered Microchannels SORELL MASSENBURG, KAARE JENSEN, DAVID WEITZ, Harvard University — Nearly every application involving fluid relies upon filtration, yet filter design is not well understood. Design features, such as shape and pore size distribution, can be modeled in two dimensions using soft lithographic techniques to fabricate microscale pores in polydimethylsiloxane. We are then able to characterize the efficacy of variations in pore design by clogging these pores with polystyrene microparticles stabilized by carboxyl surface groups. Previous studies show that a probabilistic model based upon the Poiseuille Law well describes straight microfluidic channels clogged via hard spheres that are smaller than the channel. This model predicts that clogging behavior determined by the smallest dimension of the pore (the constriction). We show that tapered microfluidic channels modeled after pores in filter membranes do not follow this model and investigated the differences. Contrasting our results to the aforementioned probabilistic model helps elucidate the function of certain filter design features.

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