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'Designer' porous channels for electrokinetic injection and microfluidic manipulation TODD SQUIRES, Caltech Physics and Applied Math, MAX NAROVLYANSKY, GEORGE WHITESIDES, Harvard Chemistry and Chemical Biology — Microfabrication techniques allow effective 'porous' media in microchannels to be designed with specified properties. In this talk, we present a general and intuitive framework for such systems. For electrokinetic phenomena, specifying the 'pore' geometry is akin to effectively determining the dielectric constant. Pressure-driven systems, on the other hand, are even richer, since an effective permeability and volume fraction can be independently controlled. Furthermore, anisotropy can be deliberately designed into the channel properties, opening a range of possibilities for microfluidic applications. We present simple, intuitive examples to highlight the basic effect, and demonstrate how such ideas can be used for applications of practical interest, such as using electrokinetic injection to form sharp sample plugs for high-resolution separations. Both theoretical and experimental results will be presented.

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