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Electrolyte transport in neutral polymer gels embedded with charged inclusions REGHAN HILL, McGill University — Ion permeable membranes are the basis of a variety of molecular separation technologies, including ion exchange, gel electrophoresis and dialysis. This work presents a theoretical model of electrolyte transport in membranes comprised of a continuous polymer gel embedded with charged spherical inclusions, e.g., biological cells and synthetic colloids. The microstructure mimics immobilized cell cultures, where electric fields have been used to promote nutrient transport. Because several important characteristics can, in principle, be carefully controlled, the theory provides a quantitative framework to help tailor the bulk properties for enhanced molecular transport, microfluidic pumping, and physicochemical sensing applications. This talk focuses on the electroosmotic flow driven by weak electric fields and electrolyte concentration gradients. Also of importance is the influence of charge on the effective ion diffusion coefficients, bulk electrical conductivity, and membrane diffusion potential.

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