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Alternative Energy: A New Frontier for Microfluidics

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Microfuidics is classified as the physics of fluid manipulation at sub-mm length scales. Typically, microfluidic techniques benefit from small sample volumes, low power consumption, and increased surface-to-volume ratio. Because of their high surface to volume ratio, microfluidic systems often utilize surface phenomena such as wettability (i.e. droplet microfluidics) and surface charge (i.e. electrokinetics) for actuation. To date, most applications of microfluidics are in medicine or biology with the purpose of creating "lab on a chip" devices. However, the scale of microfluidics is favorable for other engineering problems as well. In this talk we will discuss how phenomena typically applied to lab on a chip devices can be used to enhance energy systems. Specifically, we explore electric field driven fluid and particle flows such as electrophoresis, electroosmosis, and dielectrophoresis. We will show how these phenomena can solve a diverse array of problems, from water management in fuel cells to the selection of microorganisms for bio-energy applications.