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Hydrogel Microfluidics

Hydrogel is a network of water-insoluble polymer chains, in which large amount of water is dispersed. Various types of hydrogels have long been widely used in both scientific research and industry, ranging from tissue engineering, separation science, drug delivery, wound management, food, textile printing and paper. Because of their unusual properties (e.g., containing high water content and being similar to natural tissues), hydrogels are being used in microfluidics to provide some unique approaches to many chemistry and biological problems, including hydrogel microvalves in microchannels, substrates for cell culture and liquid microlenses in optofluidics. This presentation will give the efforts in my group to integrate hydrogels in microfluidics systems to create arbitrary chemical gradients in free, static solutions in microchannels, and generate microgel particles encapsulating biomaterials and cells for drug delivery and therapeutics. Our recent efforts in bonding separate hydrogels for making three-dimensional hydrogel microchannel networks will also be included.

Prof. Xiao-Ping Wang

The Hong Kong University
of Science and Technology

香港科技大學
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