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Electro-optofluidic devices for water and solar applications

Sung-Yong Park

National University of Singapore, Singapore

With technical advances in the area of microfluidics, the idea of using fluids for light control, and vice versa, has attracted great attention in recent years. This emerging research field of optofluidics combines the advantages of the two disciplines of microfluidics and optics. By utilizing microfluidic technologies that effectively manipulates the shape and position of liquid interfaces without bulky and complex mechanical moving parts, optofluidic devices are able to adaptively control various optical performances such as focal length, reflection/refraction, and waveguide. Another advantage is the smooth fluidic interface formed as a result of minimizing the surface energy of fluids. Such optical-grade smoothness of fluidic interfaces is very useful

and cost-effective by eliminating the need of high-precision fabrication or polishing processes typically required for solid optics. These features make optofluidic devices more versatile and reconfigurable for controlling their optical performances. In addition, optics itself has been effectively used to manipulate small-scale objects such as single cells, micro/nano particles, and liquid droplets without direct mechanical contact. By incorporating spatial light modulators, optofluidic devices provide more functionality, flexibility, low cost, and high throughput for numerous biological and micro/nanofluidic applications.

mpeps@nus.edu.sg