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Editorial

Editorial for the Special Issue on Micro/Nano-Chip Electrokinetics

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Micro/nanofluidics-based lab-on-a-chip devices have found extensive applications in the analysis of chemical and biological samples over the past two decades. Electrokinetics is the method of choice in these micro/nano-chips for transporting, manipulating and sensing various analyte species (e.g., ions, molecules, fluids and particles, etc.) [1,2]. This Special Issue in *Micromachines* is aimed to provide the recent development in the field of Micro/Nano-Chip Electrokinetics. It consists of 15 papers, which cover both fundamentals and applications, original research and reviews. These papers can be classified into four groups as summarized below.

- (1) Fundamentals of electrokinetics. Yuan et al. [3] demonstrated a tunable particle focusing in a straight rectangular microchannel with symmetric semicircle obstacle arrays by the use of electrophoretic slip-induced Saffman lift force. Zhou et al. [4] investigated the aggregation of TiO₂ submicron particles in deionized water under ultra-violet light irradiation and reported a neutralization effect on the particle zeta potential. Bashirzadeh et al. [5] proposed the use of graphite pencil-leads as low cost, disposable electrodes for the study of various electrokinetic phenomena in straight cylindrical microchannels.
- (2) Applications of electrokinetics to (bio)particle manipulations. Natu and Martinez-Duarte [6] used numerical simulation to investigate the effects of device geometry and experimental variables on the continuous sorting of neural stem/progenitor cells via streaming dielectrophoresis (DEP). Zhou et al. [7] proposed a microfluidic device with a contraction channel and tested it numerically for the deformability-based particle separation by DC DEP. Zhu et al. [8] demonstrated the use of multiple parallel microchannels in a two-layer stacked microfluidic device for a significantly enhanced throughput in particle and cell manipulation via reservoir-based DEP (rDEP). Li et al. [9] presented a rapid fabrication of high-aspect-ratio 3D hydrogel microstructures using optically induced electrokinetics (OEK).
- (3) Applications of electrokinetics to ionic species manipulation. Zhou et al. [10] proposed an electroosmotic flow-based micromixer with an asymmetrical lateral structure for enhanced fluid streams folding and stretching. Mavrogiannis et al. [11] reported a novel microfluidic method for electrokinetic mixing of laminar fluids and controlling of on-chip concentrations using fluidic DEP. Li et al. [12] demonstrated paper-based sample concentration using ion concentration polarization and sample detection with a smart phone. Zhao et al. [13] presented an overview of the various analyte concentration techniques in microfluidic devices with focus on both the physical mechanism and the representative applications.
- (4) Other electric field-based applications. Wang et al. [14] investigated the frequency-dependent electroformation of giant unilamellar vesicles in between 3D and 2D microelectrode systems. Liu et al. [15] presented a new method for analyzing the deformability of fused cells under

electrical stresses in a microfluidic array device. Tsai et al. [16] studied the effects of system parameters on the power generation by reverse electro dialysis in a microfluidic device with a Nafion ion-selective membrane. Wang et al. [17] developed a microfluidic device for classification of microalgae cells based on the simultaneous detection and analysis of the signals of fluorescence, scattering, and resistance pulse sensing.

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Conflicts of Interest: The authors declare no conflict of interest.

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