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Guest Editorial

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Guest Editorial

The manipulation of fluids in microfluidics has been studied for decades. How to miniaturize the system size and improve its efficiency are the goals to make the systems much better for practical applications. Electrowetting (EW) or electrowetting-on-dielectric (EWOD), which is used to alter the wettability of the liquid droplet on a solid substrate by inducing an applied voltage, can be employed to achieve this goal. Lab-on-a-chip, which has been used in biomedical and analytical devices, is one of the most popular applications of EWOD. Such EWOD-based devices can be used to manipulate aqueous droplets ranging from nanoliters to microliters in volume. Droplet processes such as dispensing, mixing, and splitting and transport can be realized effectively without using conventional pumps, valves, or channels. Transport of droplets by EWOD is rapid and repeatable. Other fascinating applications of EW are the adjustable lenses, electronic displays (e-paper), switches for optical fibers, etc.

Modern EW or EWOD was developed from electrocapillarity, which was first studied and described in detail by Gabriel Lippmann in 1875. Lippmann carried out experiments to study the electrocapillarity of mercury in contact with electrolyte solutions, finding that the capillary depression of mercury could be influenced by the applied voltage between the mercury and the electrolyte solution.

Scientifically speaking, EW belongs to the research topic of moving contact line (MCL) problem in multiple fields. At the moment, the MCL problem is of enormous research interest among mathematicians, physicists, chemists, and engineers. Multi-scale experiments, molecular kinetic theory modeling, and molecular dynamics simulations are combined to try to gain a deeper understanding of the MCL problem under applied voltage.

From the points of view of both practical applications and basic research, EW is a fascinating research topic and a large number of research groups worldwide are actively engaged in this field. In light of the rapid development of this field, Dr Kash Mittal, Editor-in-Chief of the *Journal of Adhesion Science and Technology* (JAST), invited me to compile and guest-edit this Special Issue on this interesting and important topic.

In light of the current high tempo of research in the arena of EW, I realized without any hesitation that there were immense opportunities that Dr Kash Mittal had foreseen. After having communicated with the EW research community, I was convinced that there was definitely a need for such cross-disciplinary publication and there was much enthusiasm among the researchers worldwide to submit manuscripts to the proposed Special Issue. The interest and enthusiasm shown by the esteemed authors fully justified my original thoughts – 30 accepted papers! Each accepted manuscript in this historic JAST Special Issue went through a rigorous peer review by 3–4 leading, world-class specialists.

I was honored to guest-edit this Special Issue of the JAST entitled ‘Electrowetting,’ and it was an interesting experience for me to have had the opportunity to communicate with so many experts in this field and to read so many high-quality papers before publication. I would like to thank all the authors for their valuable contributions to this Special Issue and the reviewers for their expert comments. I must say that these invited papers represent the state-of-the-art regarding EW issues pertinent in many areas, e.g. microelectromechanical sys-

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tems (MEMS) and lab-on-a-chip. I do believe this Special Issue will be a significant and timely contribution toward the advancement of this field.

I would particularly like to extend my special thanks to Dr Kash Mittal for his constant support, his patience, his guidance, and his careful final review of each manuscript which significantly improved the quality of the papers assembled in this Special Issue. My own paper in this Special Issue was corrected and revised two times before its final rendition as required by Dr Kash Mittal, which reflects the rigorous and high standard of the Editor-in-Chief of the JAST. I was deeply impressed.

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