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# Editorial

## Special Section on Design and Fabrication of Microscale and Nanoscale Devices for Applications in Energy, Environment, and Medicine

This Special Section on "Design and Fabrication of Microscale and Nanoscale Devices for Applications in Energy, Environment, and Medicine" brought together a wide variety of excellent contributions from the scientific community showcasing the depth and breadth in the vibrant field of microscale and nanoscale devices. The Special Section contains Expert View Papers and Research Papers.

Over the past decade, microdevices and nanodevices have emerged as routine tools in a variety of exciting applications in energy, environment, and medicine. Examples include biosensors, imaging systems, energy converters and harvesters, fuel cells, pharmaceutical test arrays, diagnostic tools, separations, drug delivery systems, and point-of-use test kits.

The first Expert View Paper discusses the use of microscale and nanoscale devices for enabling "smart" agriculture presents a new domain for the application of these devices and systems. The ideas could be integrated with existing concepts for a smart electric grid and potentially expanded to further include other essential services to modern society such as our need for clean and safe water. The second Expert View Paper focuses on the state-of-art Lab-on-chip devices, detection systems towards a large range of biological and chemical toxicants are discussed. This paper highlights the need for rapid, portable, and easy to operate systems for potential targets at trace-level concentrations. The third Expert View Paper is on the current state-of-the art for microfluidics and nanofluidics with the associated challenges for future development. A number of challenges pertaining to both numerical and experimental studies were identified and explored. For example, for Molecular Dynamics simulations, there is a need for algorithms that can yield faster numerical convergence without compromising numerical accuracy. Similarly, for experimental studies, metrology bottlenecks (such as velocimetry measurements for fluid flows at the nanoscale) were identified to be the next frontier. In short, the future of microscale and nanoscale technologies is bright with many interesting challenges that need to be scaled on the technology landscape.

Several Research Papers provide insight to new technologies being developed for several interesting applications. The use of alginate and chitosan hydrogels was reported for fabrication of microfluidic channels to generate complex geometries with potential for tissue engineering. Another paper discusses the use of pyrolytic carbon for coronary stents. As most microscale and nanoscale devices are enabled by advances in fabrication or characterization technologies, one of the Research Papers describes a facile and robust method for fabricating nanochannel networks with the lowest aspect ratios reported till date, potentially enabling several new application areas.

The Guest Editors Shaurya Prakash (The Ohio State University), Sudipta Seal (University of Central Florida), and Debjyoti Banerjee (Texas A&M University) would like to thank all the authors for their contributions, reviewers for the time and effort in ensuring high quality publications, and the ASME JNEM Staff and Editorial Board for support in completing this Special Section. We note that although the papers in this Special Section are not comprehensive but presents only a small cross section of exciting research and development in a broad and rapidly evolving area of microscale and nanoscale systems. The collection of papers here presents a window to novelty, challenges, and opportunities for further efforts in microscale, nanoscale devices, and systems for applications in energy, environment, and medical technology.

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