# *Novel Patterning Technologies for Semiconductors, MEMS/NEMS, and MOEMS 2019*

**Martha I. Sanchez**
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*Editors*

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# Introduction

The Novel Patterning Technologies for Semiconductors, MEMS/NEMS and MOEMS 2019 Conference is a forum for new solutions to meet current and future patterning challenges. Extending scaling or complementing existing approaches is in scope and this year we expanded beyond traditional wafer pattering to address emerging patterning challenges in MEMS/NEMS and MOEMS with 2 sessions of invited speakers.

The MEMS/NEMS and MOEMS space is at the interface between microelectronics and the physical world, acting often as sensors or actuators in the automobile industry, medical devices and military, for example. They face challenges defined by patterning high aspect ratio features and extreme topography with similar critical dimensions to microelectronics in cases. Successful patterning requires meeting complex material, mechanical and topology constraints.

This year the Novel Patterning Conference had 56 invited and contributed papers. The conference began on Monday afternoon with two Keynote presentations. A third Keynote talk on Tuesday morning kicked off the new MEMS/NEMS and MOEMS topic. There were 7 major topics, 12 oral sessions, and a poster session held on Wednesday evening.

The conference kicked off with two Keynote presentations, Donald Tennant, from Cornell University (United States), spoke about "The evolution of the Cornell NanoScale Facility and synergies with the semiconductor Industry". He discussed the history leading up to the Cornell NanoScale Facility and the range of projects researched at the CNF serving industry and academia. Chris Mack's (Fractilia, United States) talk "Will stochastics be the ultimate limiter for nanopatterning?" further elaborated on Tennant's Law. Combined, the talks reviewed the tremendous progress made in patterning as well as the challenges ahead in achieving further resolution improvement without running into stochastics limitations.

The third Keynote presentation was from Daniel Lopez from Argonne National Laboratory (Unted States). His talk "Integration of metasurfaces onto micro electro mechanical systems for active control of visible and IR light" began our 2 Invited sessions on MEMS/NEMS and MOEMS. Metasurfaces in optics is a way of achieving high quality imaging with minimal stack height by material choice and placement.

There were two more new topics, both invited sessions on Neuromorphic Computing and 3D Printing. Additionally, there was an invited session on multi-

beam lithography, two sessions on nanoimprint, a DSA joint session with the Advances in Patterning Materials and Processes Conference covering new materials, integration, and characterization, and three sessions on novel patterning and/or materials.

Finally, we would like to thank those program committee members who took the time and effort to review abstracts and contributed to making a technically strong program. We look forward to expanding our novel patterning topics, and your continued contributions to new patterning technologies. One new topic for 2020 will be flat panel displays and advanced packaging tools/techniques.

**Martha I. Sanchez**
**Eric M. Panning**