

Theme: Semiconductor Process

- Sub theme: Metaphotonics for Advanced Electronics, Integrated Si Photonics

Semiconductor electronics have significantly advanced over the past decades by introducing new science and technologies. We look forward to innovative metaphotonics research to further such progress by breaking through the facing technical challenges. For example, the lithography node will reach almost 1nm scale, and advanced packaging using heterogeneous integration and 3D IC will evolve toward higher interconnect density and energy efficiency for the future system ICs. Cameras and sensors will shrink three-dimensionally exploiting computational algorithms and expanding application spectra to UV and LWIR. Novel metasurfaces and metamaterials are expected to bring crucial impacts on such frontiers as core devices as well as manufacturing and measurement technologies.

Original research proposals are of interest, related to the following list of topics (but not limited to) :

1. Plasmonic/dielectric metasurfaces/metamaterials, surface plasmons
2. Novel devices related to sub-diffraction-limited imaging, high-bandwidth interconnects, thermal management for heterogeneous integration and 3D IC
3. High resolution imaging for lithography and advanced packaging
4. Innovative cameras and sensors: miniaturization, deep-optics/computational imaging, invisible spectra, edge-sensors

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The industry is quickly approaching the practical limits of electrical I/O performance. As demand continues to increase, electrical I/O power-performance scaling is not keeping pace and will soon limit available power for compute/memory operations. This performance barrier can be overcome by integrating optical I/O.

LiDAR will be an indispensable component for future mobility and autonomous driving due to its unique nature of small diffraction and high resolution. High price of LiDAR hinders its adoption, and compact and reliable LiDAR sensor based on integrated photonics can overcome the barrier.

We are highly interested in (but not limited to) the following list of topics:

1. High-speed low-power optical interconnect devices and circuits
2. Monolithically integrated light sources
3. Solid-state LiDARs

※ The participants are also encouraged to propose new ideas outside the topics listed above.

※ Funding: Up to USD 150,000 per year