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Conference & Exhibition



## Keynote speaker:

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## Title of the Presentation:

**Recent Advances in Plasmonic Interconnect  
Technologies**

## Short CV

Attila Bonyár is a full professor, vice head of department and head of the Nanotechnology and Sensorics Research Group at the Department of Electronics Technology, Faculty of Electronics Engineering and Informatics, Budapest University of Technology and Economics. He is an elected member of the Hungarian Academy of Sciences (HAS) General Assembly. He has been a senior IEEE member since 2021 and actively serves in several IEEE committees. In 2025, he received the EUROSENSORS Fellow award. His activities focus on developing optical biosensor technologies that utilize plasmonics and nanomaterials.

## Abstract

Several issues that prevent significant increases in processor performance can be traced to thermal and signal-delay effects associated with electronic interconnects. While optical interconnects might offer solutions to these problems, the size mismatch relative to electronic interconnects prevents their convenient co-integration. Plasmonics is gaining increasing attention as a possible solution to overcome these bandwidth limitations by combining the advantageous properties of both classical electronic and advanced optical interconnects. Surface plasmon polaritons (SPPs) are collective electron oscillations excited by and coupled with electromagnetic waves at the boundary of a material with negative permittivity (traditionally metals) and an insulator with positive permittivity. In plasmonic interconnects, SPPs transport information at the interface between two materials at ultrafast speeds while offering sub-wavelength resolution. While SPP-based interconnects can reduce signal delay, their main disadvantage is the high propagation losses, which limit the achievable interconnect lengths. Losses in tightly confined plasmonic systems also force a trade-off between energy per bit and interconnect density. To tackle these challenges, many new material systems and fabrication technologies have emerged in the past decade. In addition to classical metallic thin-film-based plasmonic waveguides, interconnects have been fabricated from transition-metal nitrides or two-dimensional materials. The talk will introduce plasmonic interconnects and the challenges hindering their applicability, focusing on recent advances, novel material systems, and nanofabrication technologies to solve these issues.