

9th International Conference on

Nanoscience and Nanotechnology

July 09-10, 2026 | London, UK

Volume: 09

Atomic-Scale Nanostructures and Surface Engineering for Next-Generation Nanodevices

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Atomic-level control of nanostructures has become essential for developing advanced electronic, optical, and biomedical technologies. This presentation explores recent advances in scanning probe microscopy, nanolithography, molecular self-assembly, and surface engineering that enable precise fabrication of nanoscale materials. Modern characterization techniques provide detailed insights into the physical and chemical behavior of nanostructures under realistic operating conditions.

The session discusses applications in nanoelectronics, biosensors, molecular devices, and smart surfaces for healthcare and environmental monitoring. Artificial intelligence-assisted materials design, quantum nanotechnology, and hybrid nanostructures are accelerating innovation across multiple scientific disciplines. Future developments include autonomous nanofabrication and multifunctional nanosystems for industrial and biomedical applications.

Biography

Harald Fuchs is Professor of Experimental Physics at the University of Münster, Germany. His research focuses on nanotechnology, scanning probe microscopy, surface science, molecular nanostructures, and nanoelectronics. He is internationally recognized for advancing nanoscale characterization and nanomaterials research.