ABSTRACT:

Quantitative Surface Imaging and Spectroscopy

Adi Salomon[1,2]
[1] Department of Chemistry, BINA nano-center for advanced materials and nanotechnology, Bar-Ilan University
[2] Saint-Pères Paris Institute for the Neurosciences, Université Paris Cité, Paris, F-75006 France

Interfaces govern how materials organize, react, and transform-from catalytic metals to biological membranes, yet nanoscale dynamics at these boundaries remain elusive. We introduce smart surfaces, ultrathin fluorescent films (<10 nm) and plasmonic substrates, that act as optical encoders, converting near-field information into measurable far-field signals.

Using our smart surfaces together with back-focal-plane imaging we achieve in real-time, quantitative information at processes occurring near interface, such as local refractive index and nanometric axial metrology.

Combining total-internal-reflection and supercritical-angle fluorescence imaging with polarization- and spectrum-resolved detection, this platform provides label-free, quantitative access to interfacial chemical and physical changes, paving the way for advanced nanoscale sensing and environmental monitoring.