

## **Quantitative surface Imaging and spectroscopy**

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### **Abstract**

Numerous processes, including biofilm growth, crystallization, membrane transport, and chemical reactions, take place near surfaces and interfaces. Obtaining in-operando insights into these dynamic near-surface processes remains a significant challenge, particularly for achieving nanoscale resolution in the axial direction. Current techniques, such as DNA origami, offer single-point calibration but are limited in their ability to provide field-wide applicability and comprehensive spatial insights.

In this talk, I will introduce our recent advancements in smart surfaces for near-field readout under operational conditions, enabling the decoding of surface properties using far-field optics.

Our smart surfaces enable local refractive-index measurements, thin-film characterization, and nanoscale axial calibration with exceptional speed, positioning it as a future tool in interface studies.