Unlocking Nanoscale Optical Insights Beyond the Diffraction Limit

Near-Field Optical Nanoscopy of 2D Oxide Membranes with a Park NX10-Based Platform

The Challenge

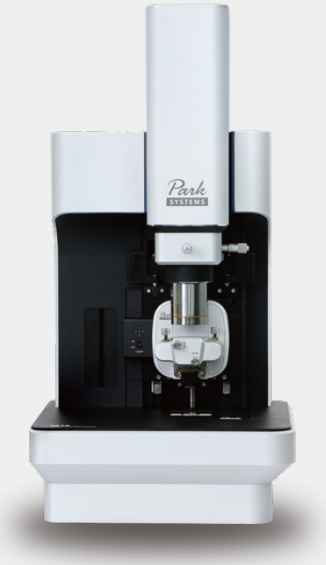
"Many of the most important optical phenomena in quantum materials occur far below the diffraction limit. To study them reliably, we needed a platform capable of maintaining nanometer-scale stability during near-field optical measurements."

— Prof. Alex McLeod
School of Physics and Astronomy

University of Minnesota

Your Challenge, **Our Solution**

Park NX10



This case study is adapted from Prof. Alex McLeod's NANOscientific Symposium Americas presentation and interview, published in NANOscientific Magazine Vol. 29.

Park SYSTEMS

Park NX10
Customer Success Story

UNIVERSITY OF MINNESOTA

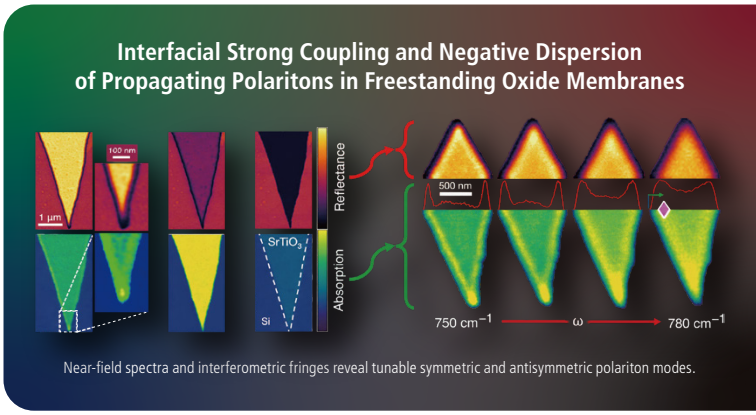


The Solution

Stable AFM Foundation
Provides the mechanical stability required for demanding near-field optical measurements

Correlated Nanoscale Mapping
Correlates AFM topography with local optical response to accurately interpret nanoscale features

Custom Near-Field Optical Integration
Provides a stable AFM platform for the custom near-field optical setup



Deep-Subwavelength Optical Mapping
Enables infrared near-field imaging and spectroscopy beyond the far-field diffraction limit

Related Publication
Advanced Optical Materials 13(29), e01452 (2025)DOI: 10.1002/adom.202501452

The Results

Tunable Symmetric and Antisymmetric Modes
Resolves interfacially coupled polariton modes with distinct dispersion behavior

Direct Visualization of Surface Phonon Polaritons
Reveals propagating surface phonon polaritons in freestanding $SrTiO_3$ membranes

Tunable Negative Dispersion
Demonstrates that polariton dispersion can be controlled through membrane thickness and dielectric environment

Reconfigurable Nanophotonics Platform
Establishes freestanding oxide membranes as a platform for tunable transformation optics at the nanoscale

"Near-field nanospectroscopy requires extreme mechanical stability and precise topographic correlation. Park NX10 platform enabled us to reliably probe optical phenomena far below the diffraction limit with exceptional spatial precision."

— Prof. Alex McLeod

