

Surface Phonon Polaritons and Engineered Reststrahlen Bands

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Tischler Group

OU REU 2026

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Light-Matter Interaction

LAB



Surface Phonon Polaritons



- Phonon
 - Quasiparticle
 - Collective excitation of particles
- Phonon Polaritons
 - Light couples with lattice vibrations

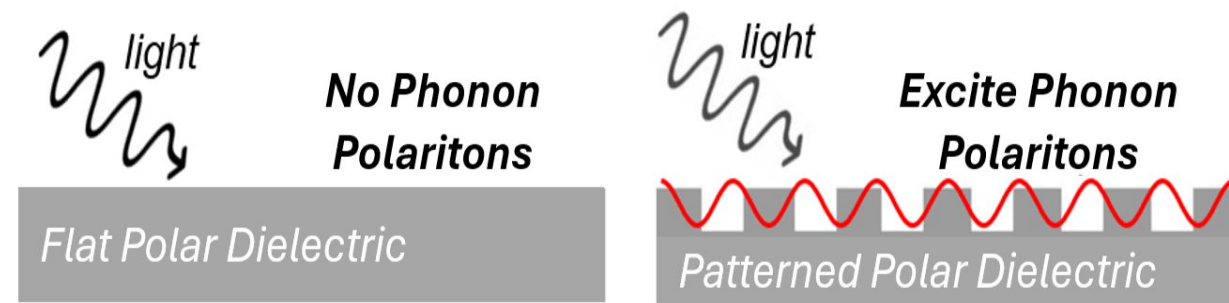


Diagram from Dewa Ade-Onojobi



Gradient Fabrication

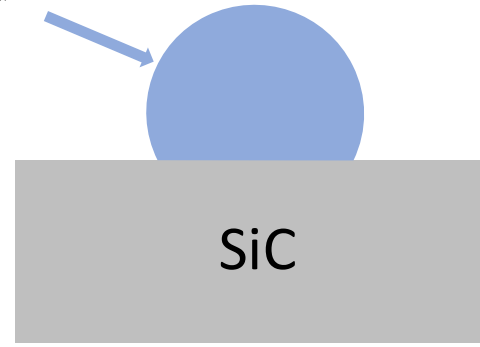


Drop of IP-Dip 2 polymer

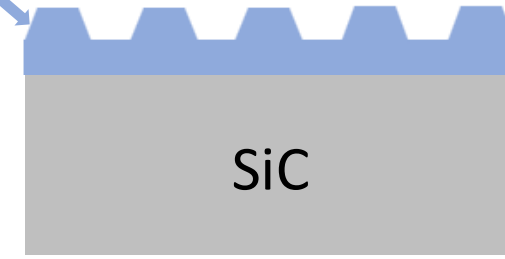
Polymer



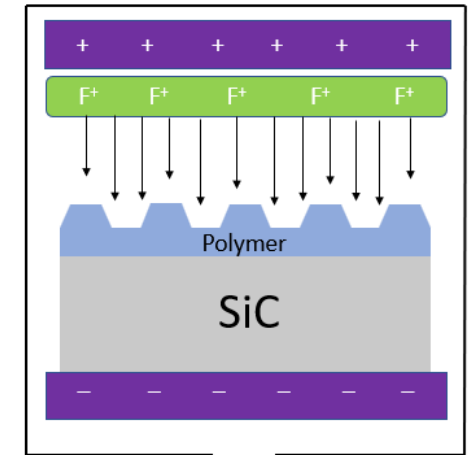
Cleaned Substrate



Substrate Preparation



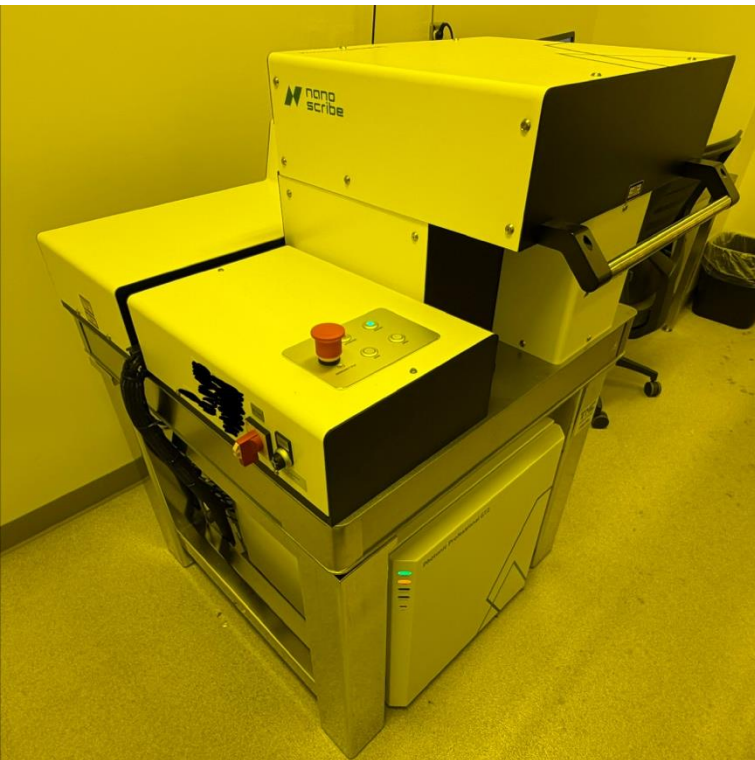
Pattern writing



Reactive Ion Etching



Finished Sample



Nanoscribe
PPGT2

Diagram from Dewa Ade-Onojobi



Reststrahlen Bands

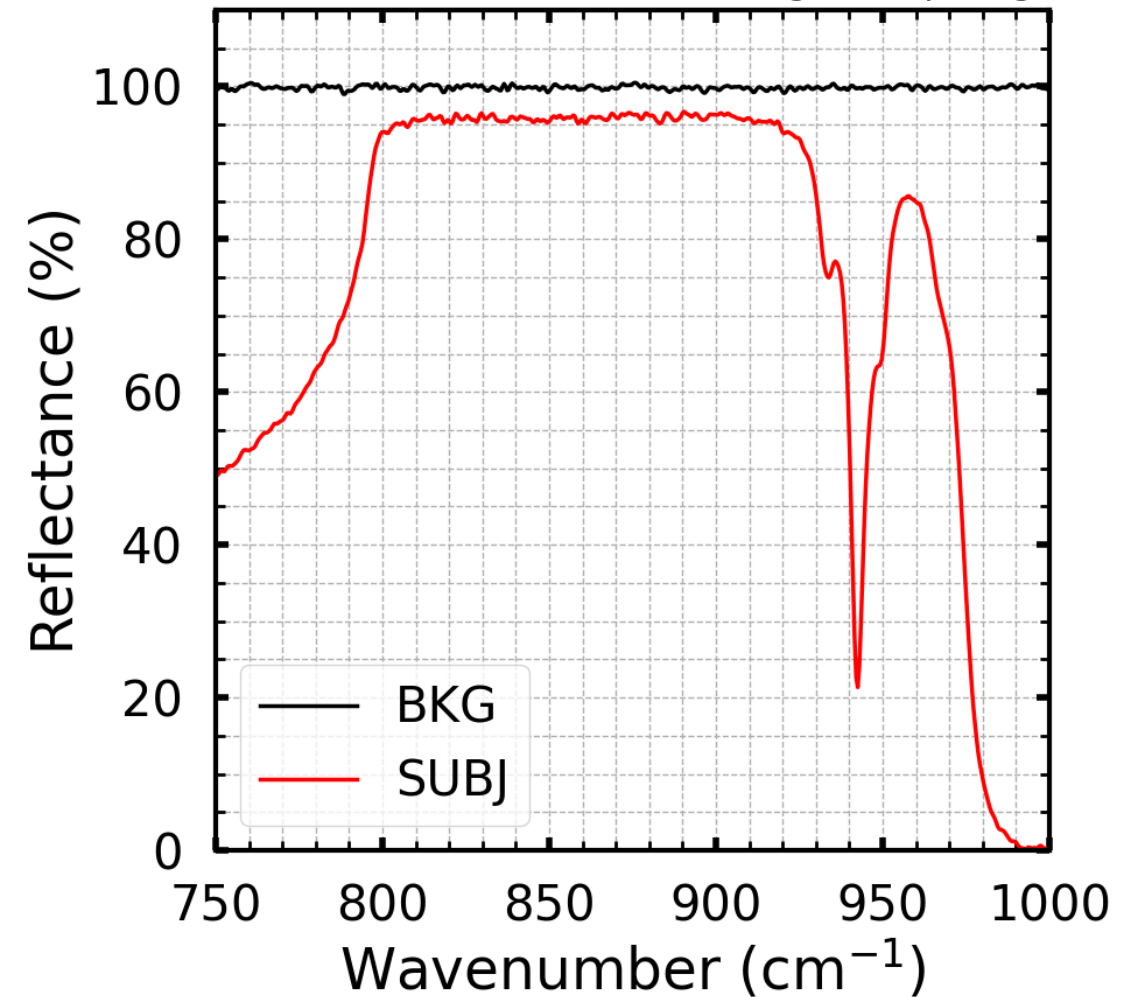


- A range of frequencies that are unable to propagate within a substrate
- Results in very strong reflection
- Engineering surface allow surface phonon polaritons to form at specific wavenumbers

https://en.wikipedia.org/wiki/Reststrahlen_effect

DOA10212024

Date: 2026-06-08 TLW: 1 BLW: 5 Height: 3 Spacing: 1



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- Check samples for leftover polymer
 - Test IR reflectivity
- Analyze results
- Continue with AFM if needed



Brunker Tensor 27 and Brunker Hyperion setup for Fourier Transform Infrared Spectroscopy



Why do we care?



- Sensing
- Thermal Management
- Nanoscale Imaging
- Communication



Questions?