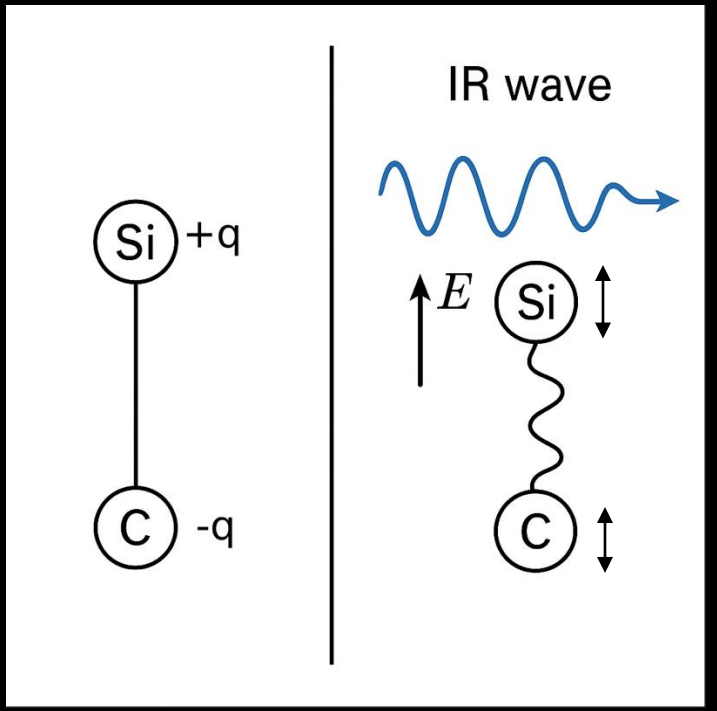
SiC Grating Fabrication and Phonon-Polariton Excitations

James Byrd

BACKGROUND

- Gratings
  - Silicon Carbide (SiC)
  - 5 min vs 10 min
- What is a phonon?
  - Quantized material oscillations
- What is a phonon-polariton?
  - Interaction between EM wave and phonon

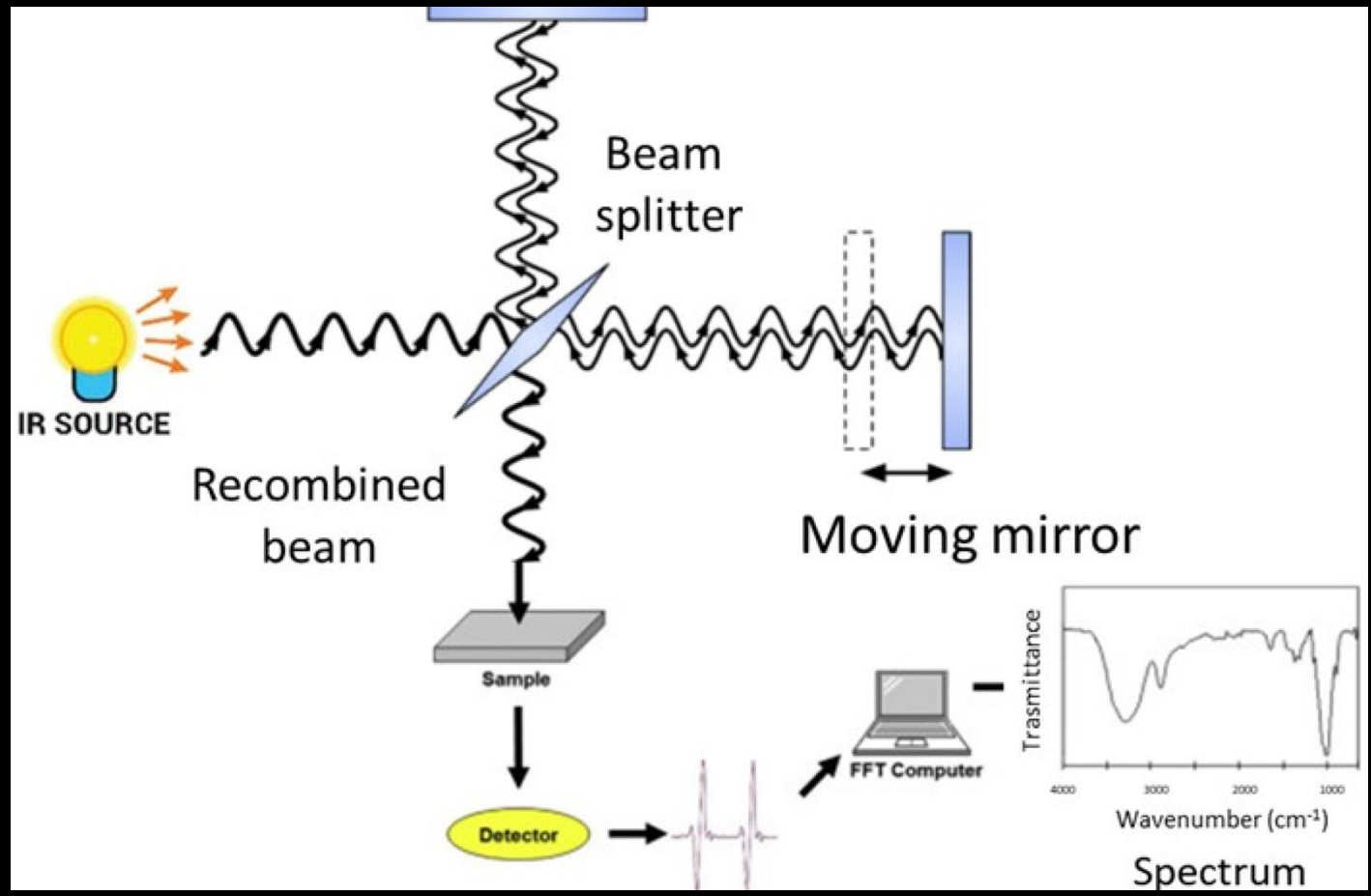


THE OBJECTIVE

- Consistently create new grating geometries
- Understand phonon-polaritons
- Discover applications

TOOLS OF THE TRADE

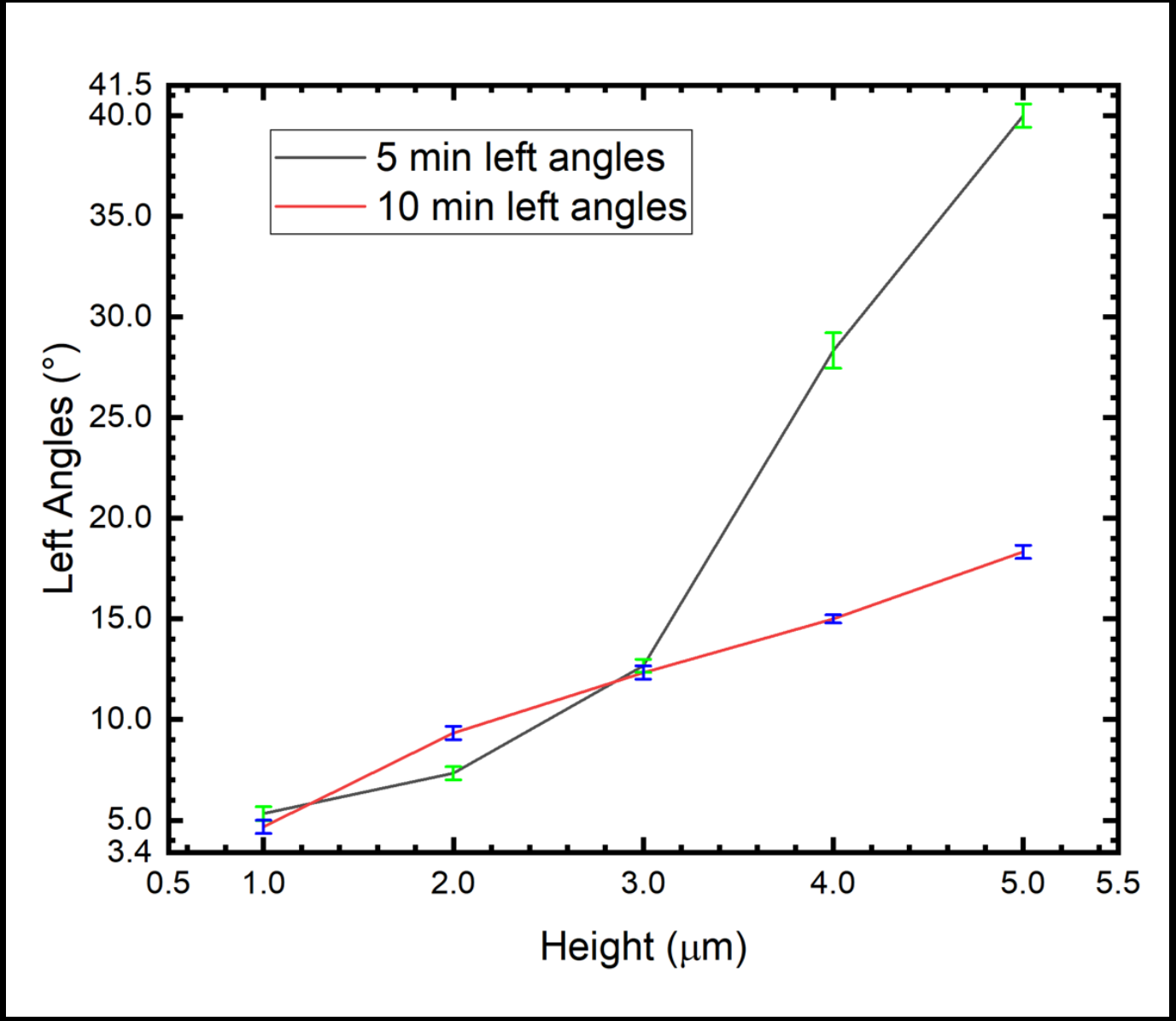
- Fourier Transform Infrared Spectroscopy (FT-IR Spectroscopy)
  - Michelson Interferometer
- Scanning Electron Microscope (SEM)
- Atomic Force Microscopy (AFM)
- OriginLab
- COMSOL

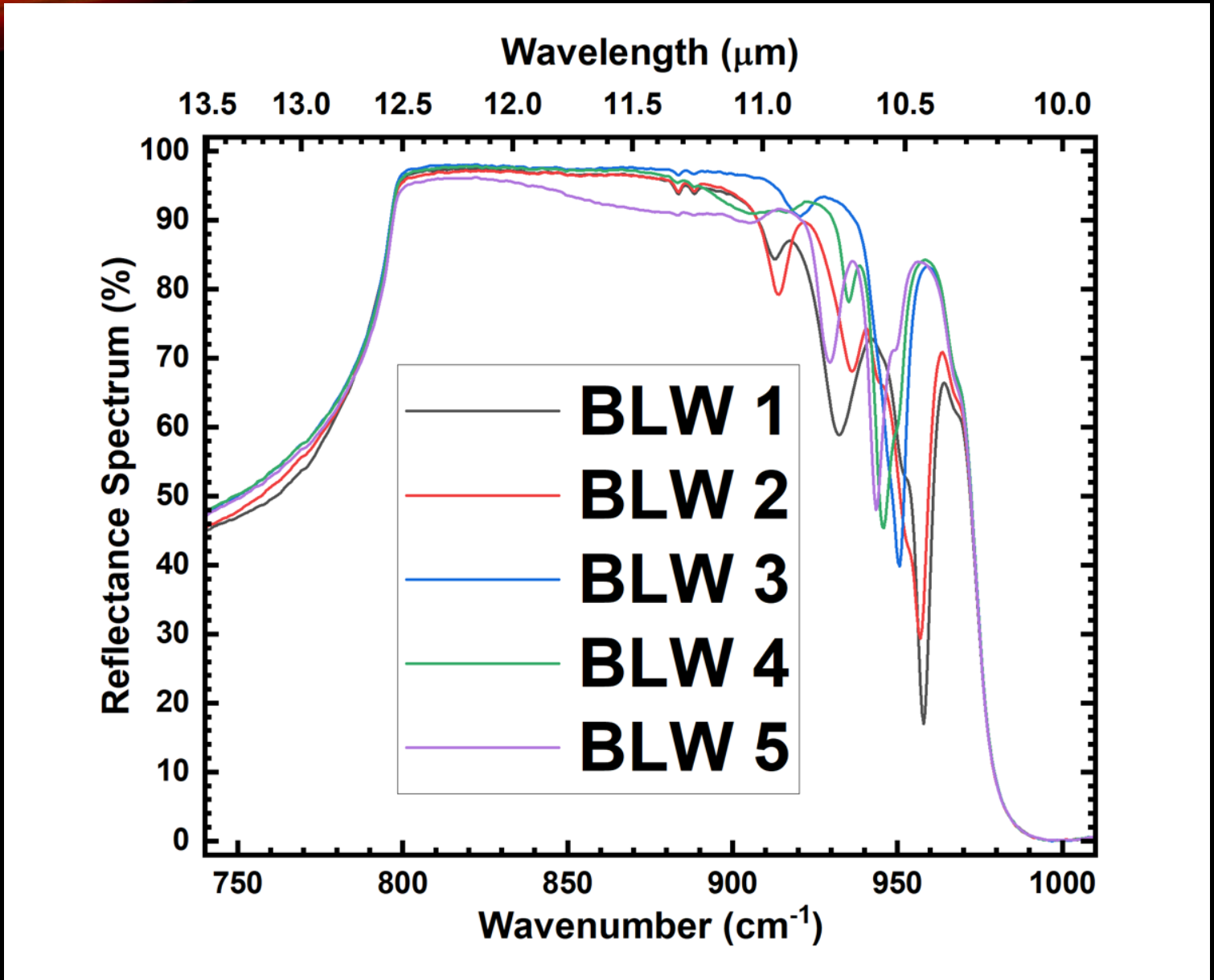


https://www.mdpi.com/biophysica/biophysica-03-00011/article_deploy/html/images/biophysica-03-00011-g001-550.jpg

WHERE WE'RE AT

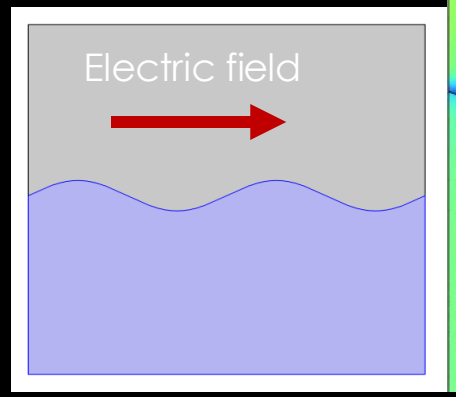
- Understanding grating dimensions
  - AFM and SEM
- Measuring grating reflectance spectra



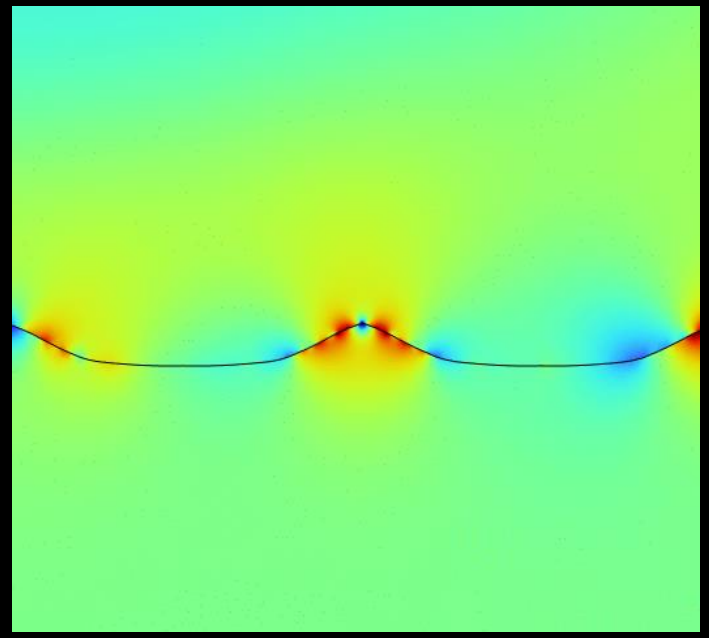

Wavelength (μm)
13.5
13.0
12.5
12.0
11.5
11.0
10.5
10.0
Reflectance Spectrum (%)
100
90
80
70
60
50
40
30
20
10
0
750
800
850
900
950
1000
Wavenumber (cm-1)
BLW 1
BLW 2
BLW 3
BLW 4
BLW 5

WHERE WE'RE GOING

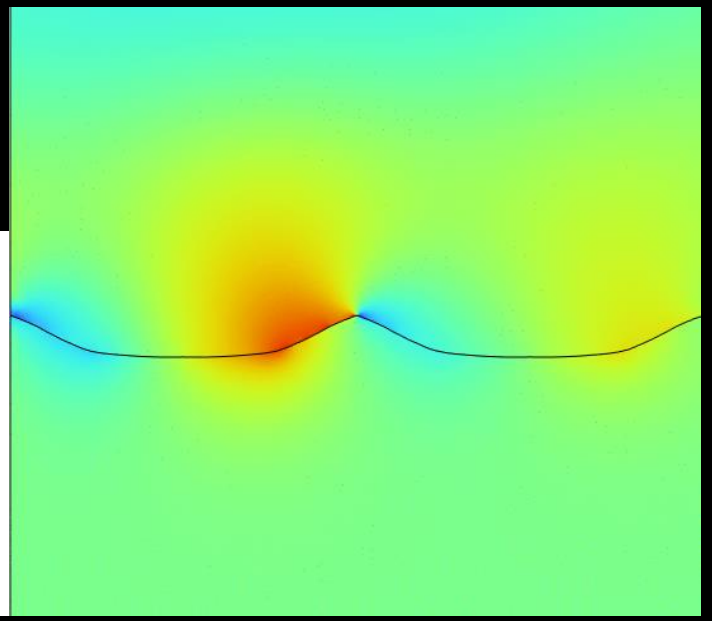
- Continue reflectance spectra
- Simulate grating-E field interactions



Localized Mode



Travelling Mode



THANK YOU

Questions?