# Exfoliation of WSe2 for Generation of Quantum Light Sources

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QPL Quantum Photonics Lab UC Santa Barbara

UC SANTA BARBARA Quantum | Foundry

DMR-1906325

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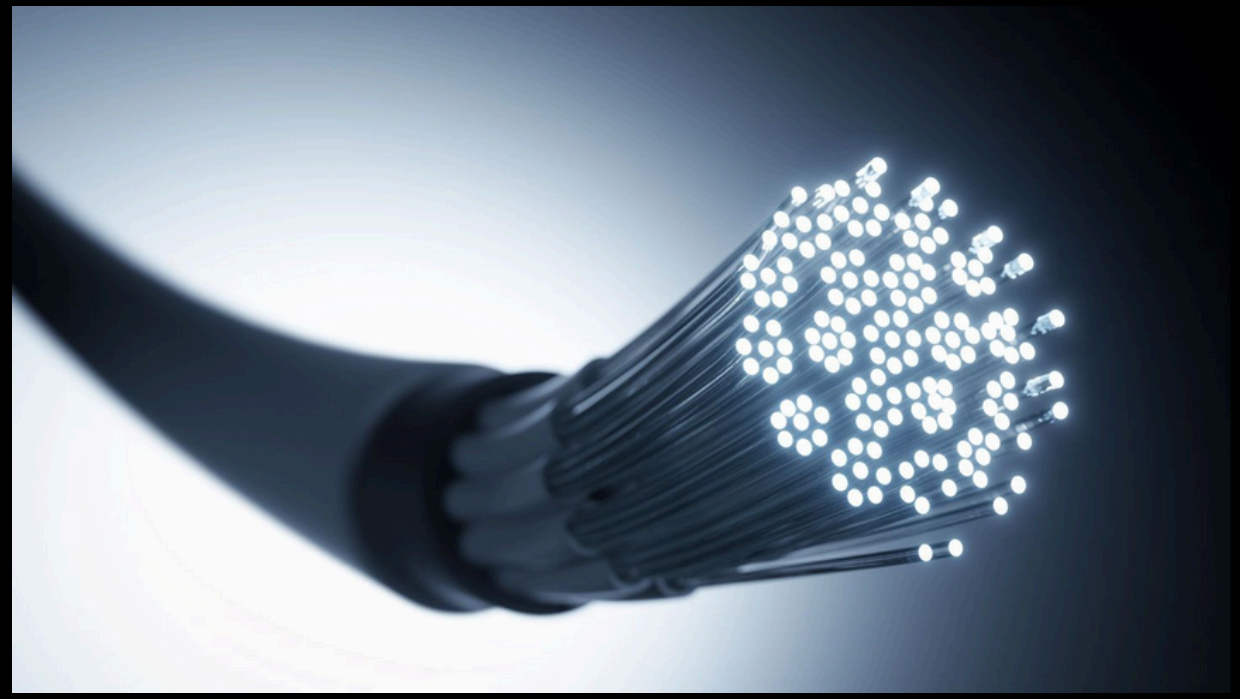
# Moody Lab

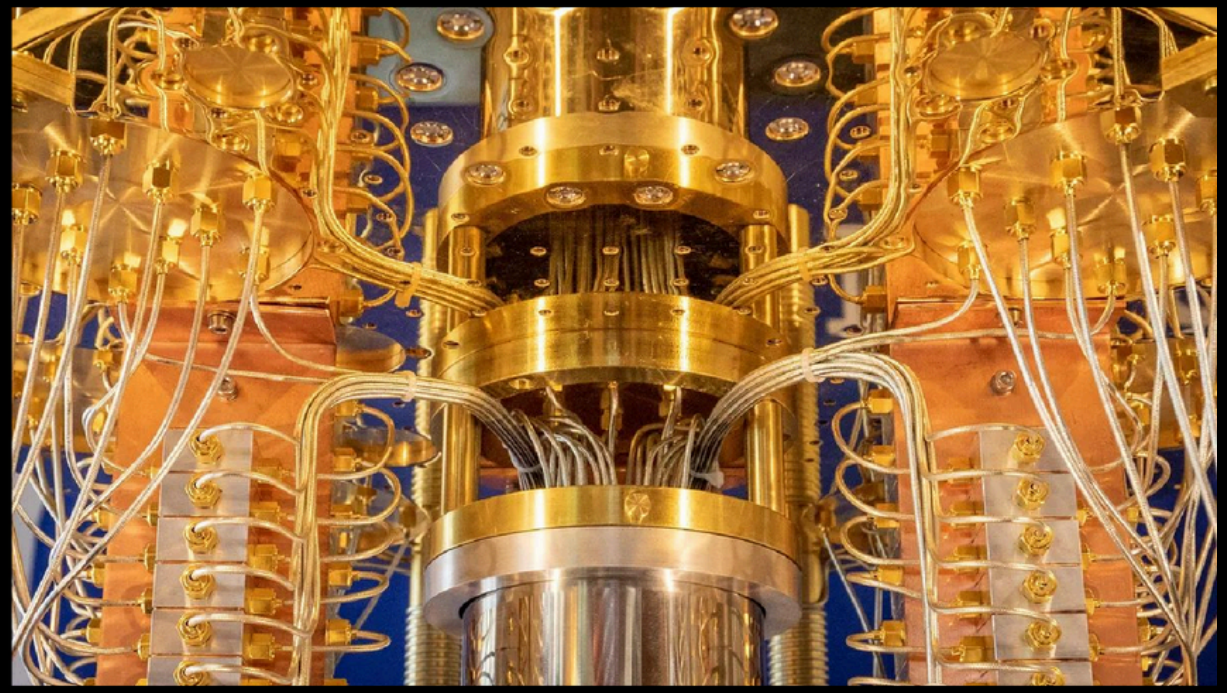
What are we up to?

# Creating Quantum Light for Use in Current Photonics



Via Science News Explores

Optical Fiber - A part of traditional telecommunications



Via CNET

Quantum Computer

# Applications of Quantum Technologies

Via Maryville Online

Healthcare

Via Forbes

Finance & Business

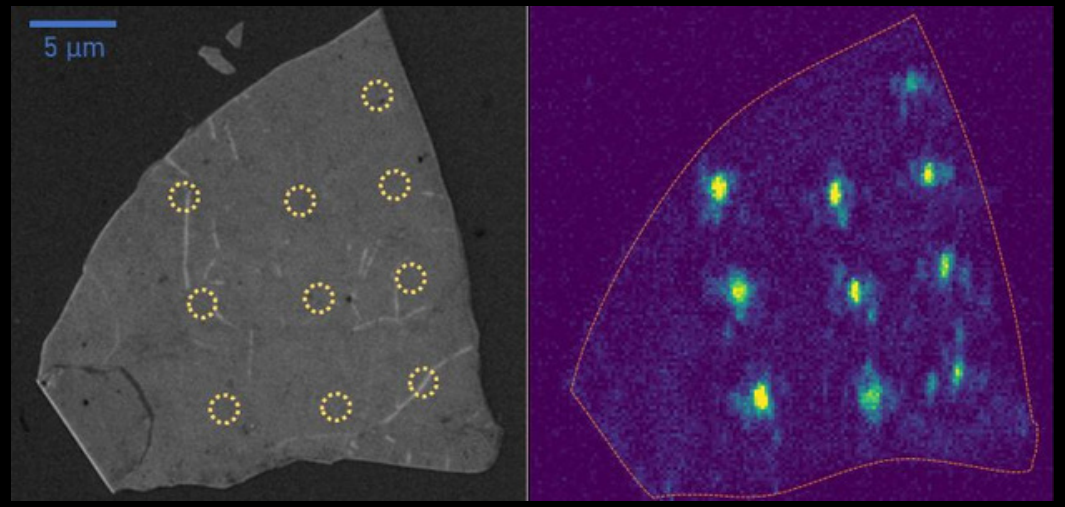
# Single Photon Emitters

What are they, and why do we need them?

# Single Photon Emitters (SPEs) are Like Tiny LEDs

Via Physics World

Via ILNY




Via GEMaC

Via Physics World

# We Need SPEs for Quantum Computing

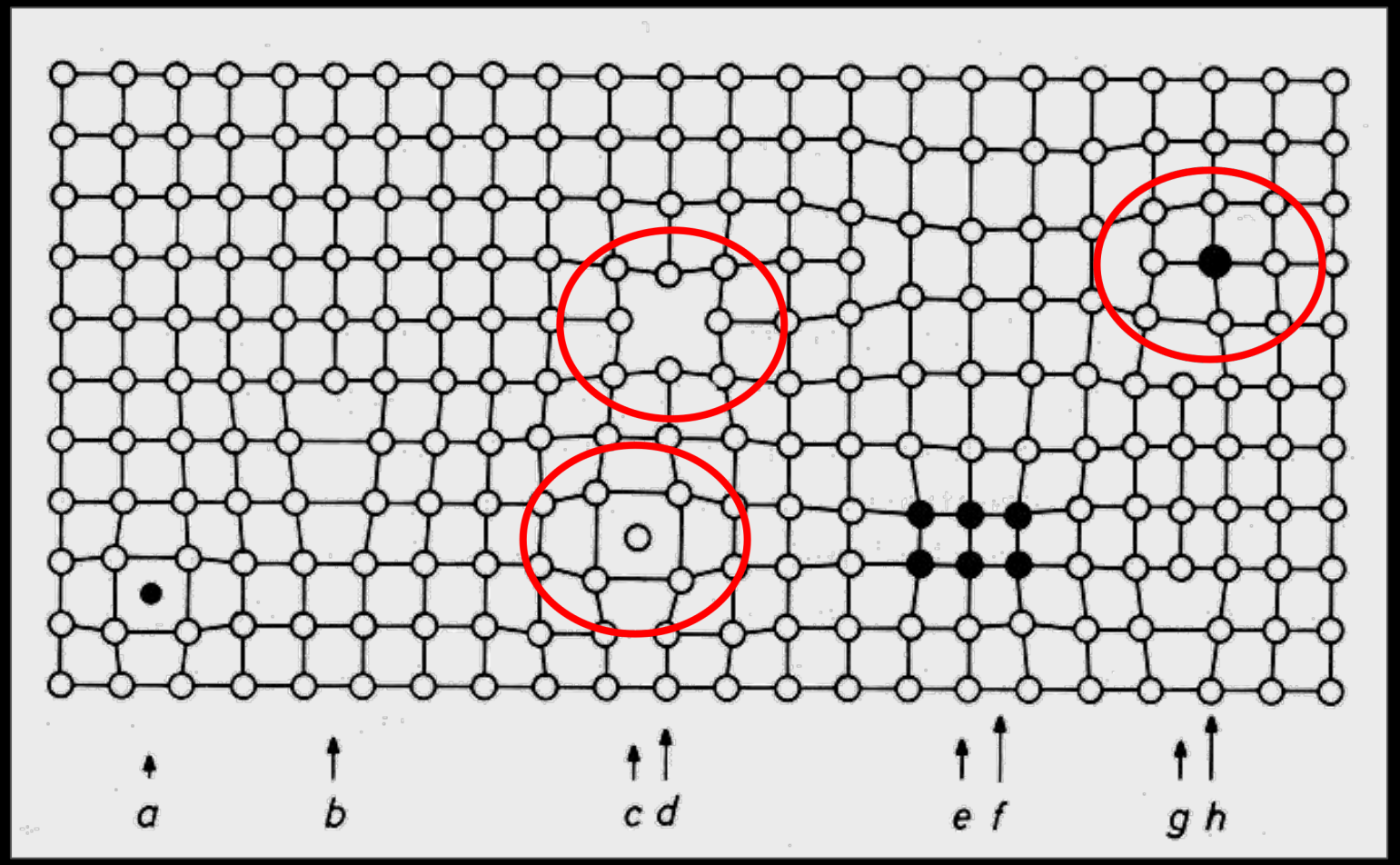

Energy In

Photonic Calculator

Light Source

Via Applied Physics Letters

# SPEs Originate From Defects in Crystal Lattices




Via Christian-Albrechts-Universität zu Kiel

Defects distort structure, creating energy potential

# 2D Materials

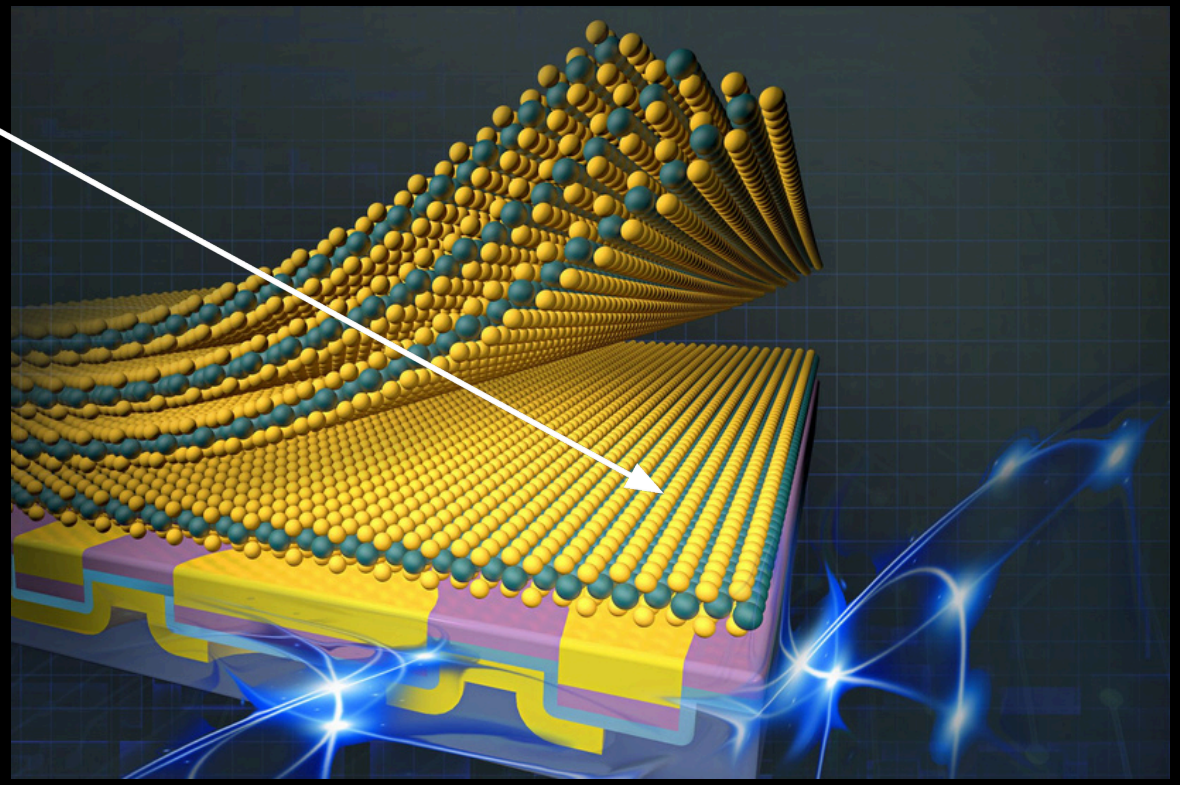
## What is a 2D material?

# 2D Materials are Thinned Variants of Classical Solids

Individual Molecular sheet "monolayer"

Via NicePng

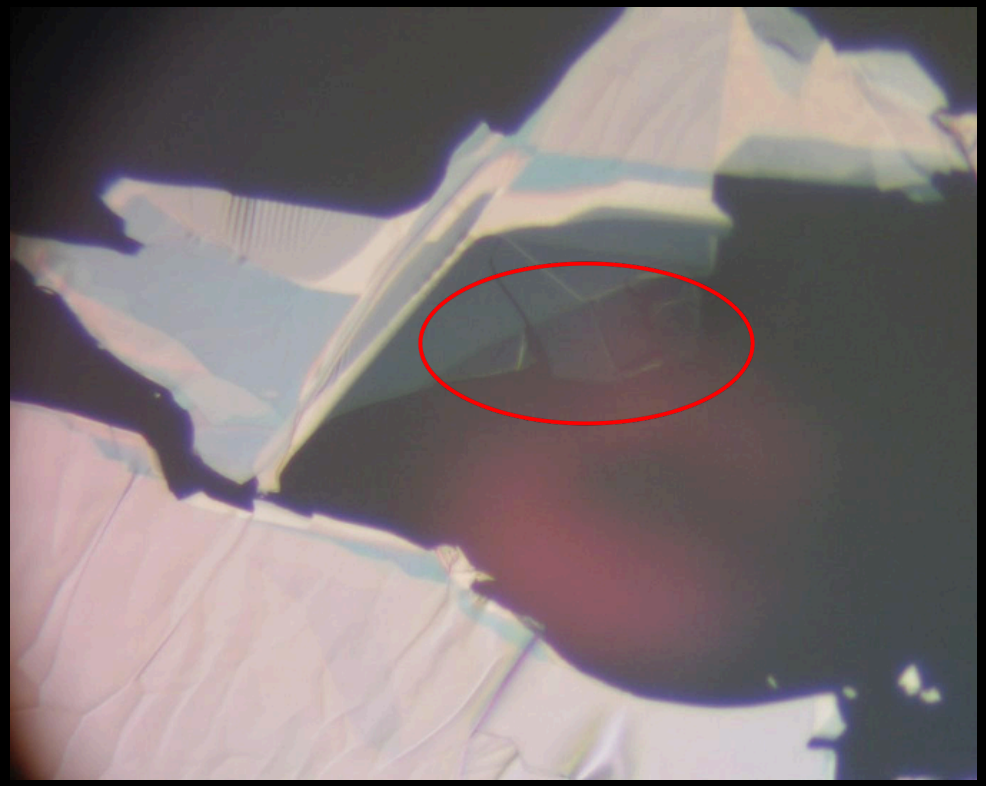
Paper Analogy



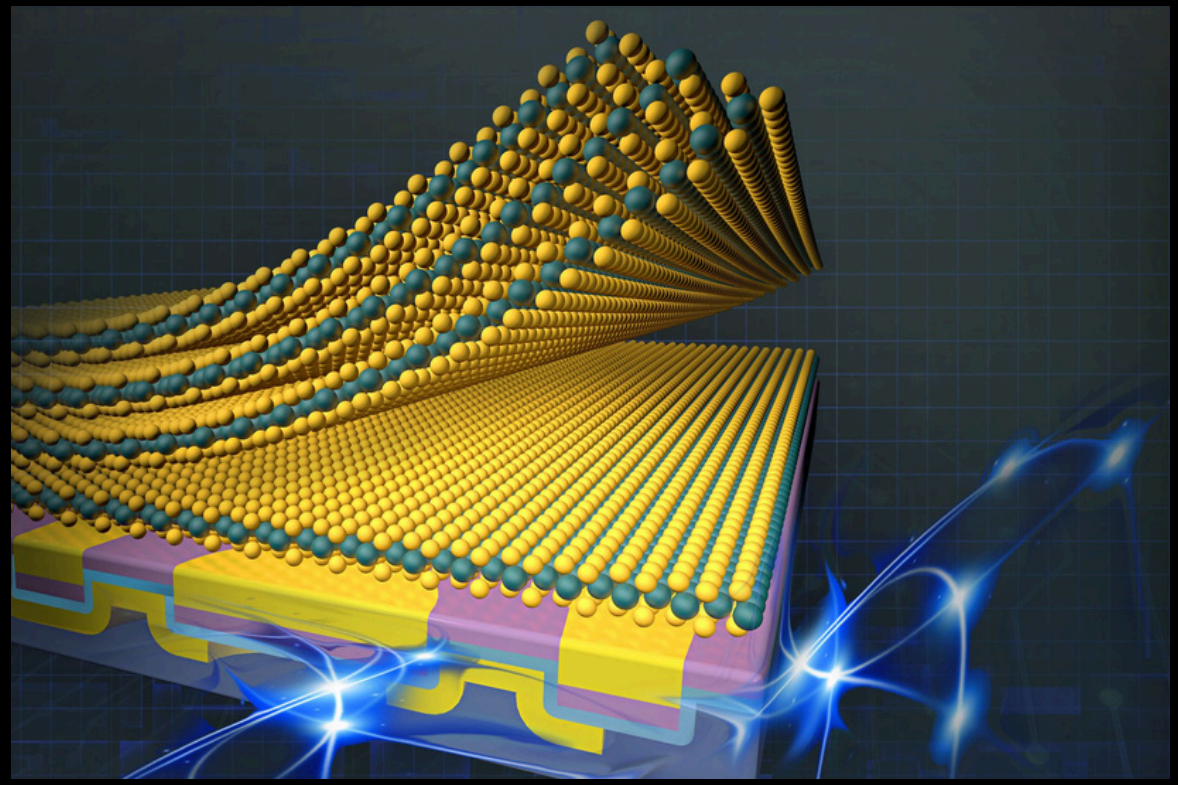
Via MIT News

Atomic Structure of $WSe_2$

# 2D-Materials Exhibit Novel Properties



Monolayer of $WSe_2$



Via MIT News

Atomic Structure of $WSe_2$

# Exfoliation

How to create 2D materials

# Atomic Thinning of WSe2 to Create Monolayers

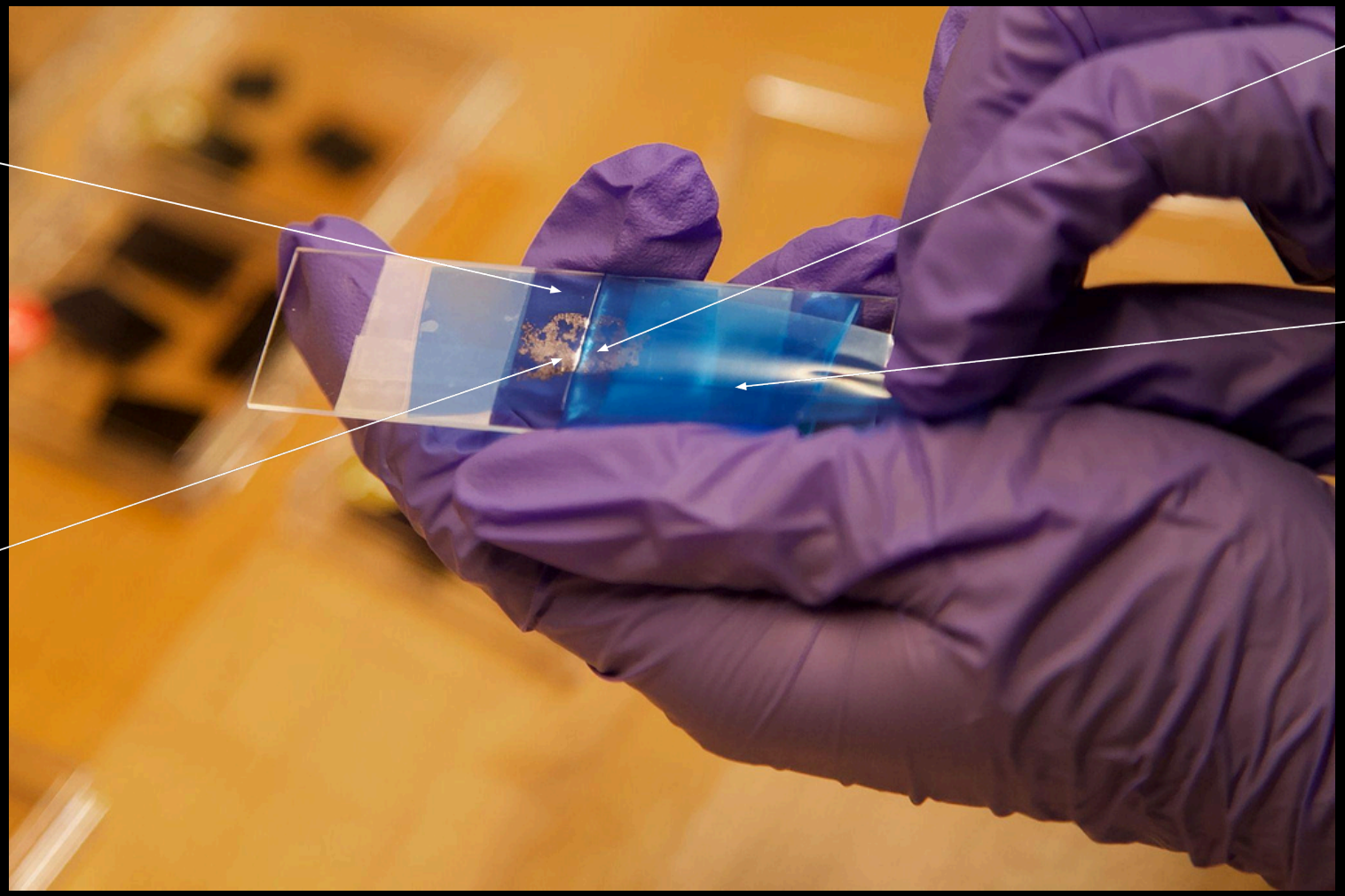
Via 2D Semiconductors

Bulk of $WSe_2$

≈1:7

(WSe2 = Tungsten Diselenide)

# Methods - “Exfoliation”



# Methods - “Stamping”

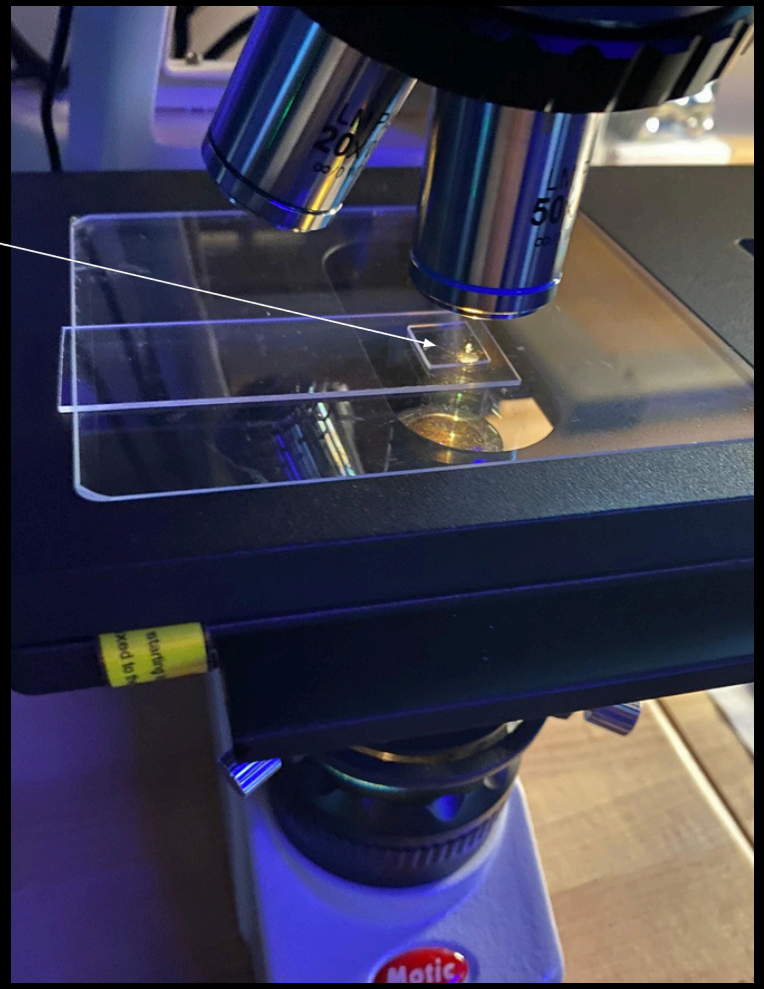
Squeegee

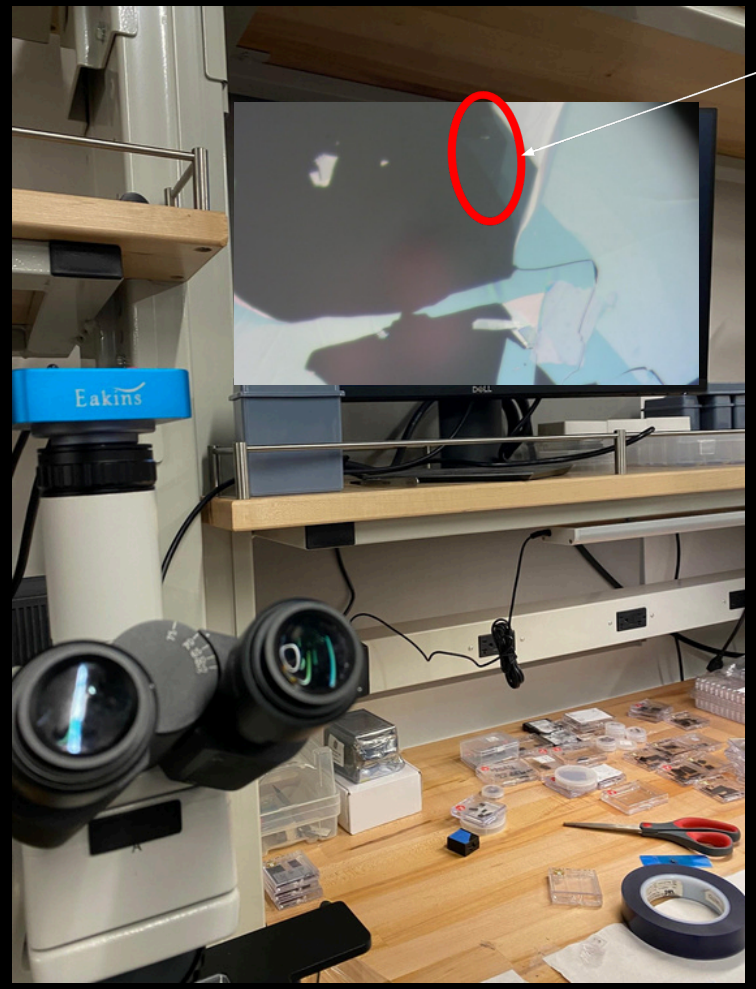
Daughter tape
“Stamp”

PDMS (transfer gel)

# Methods - Analyzing Exfoliated Sample

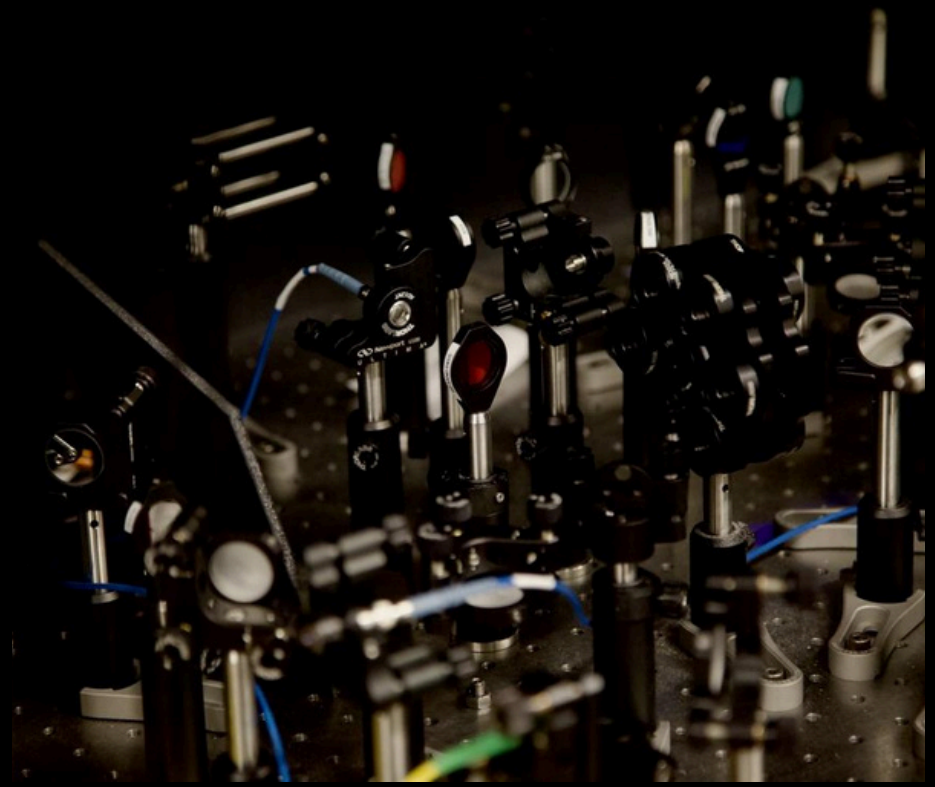
Exfoliated Sample



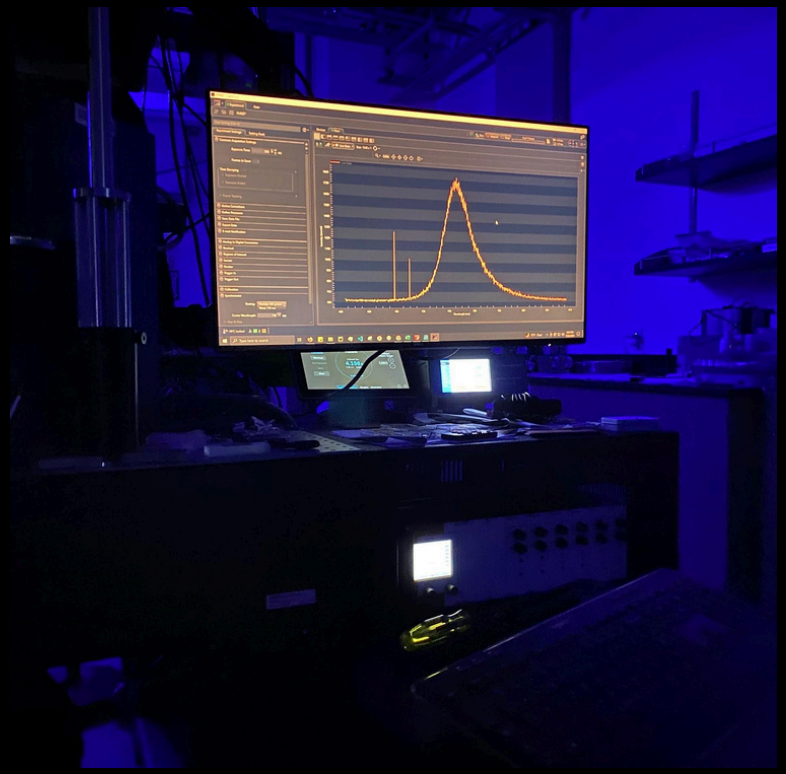



Monolayer

# Methods - Spectroscopy



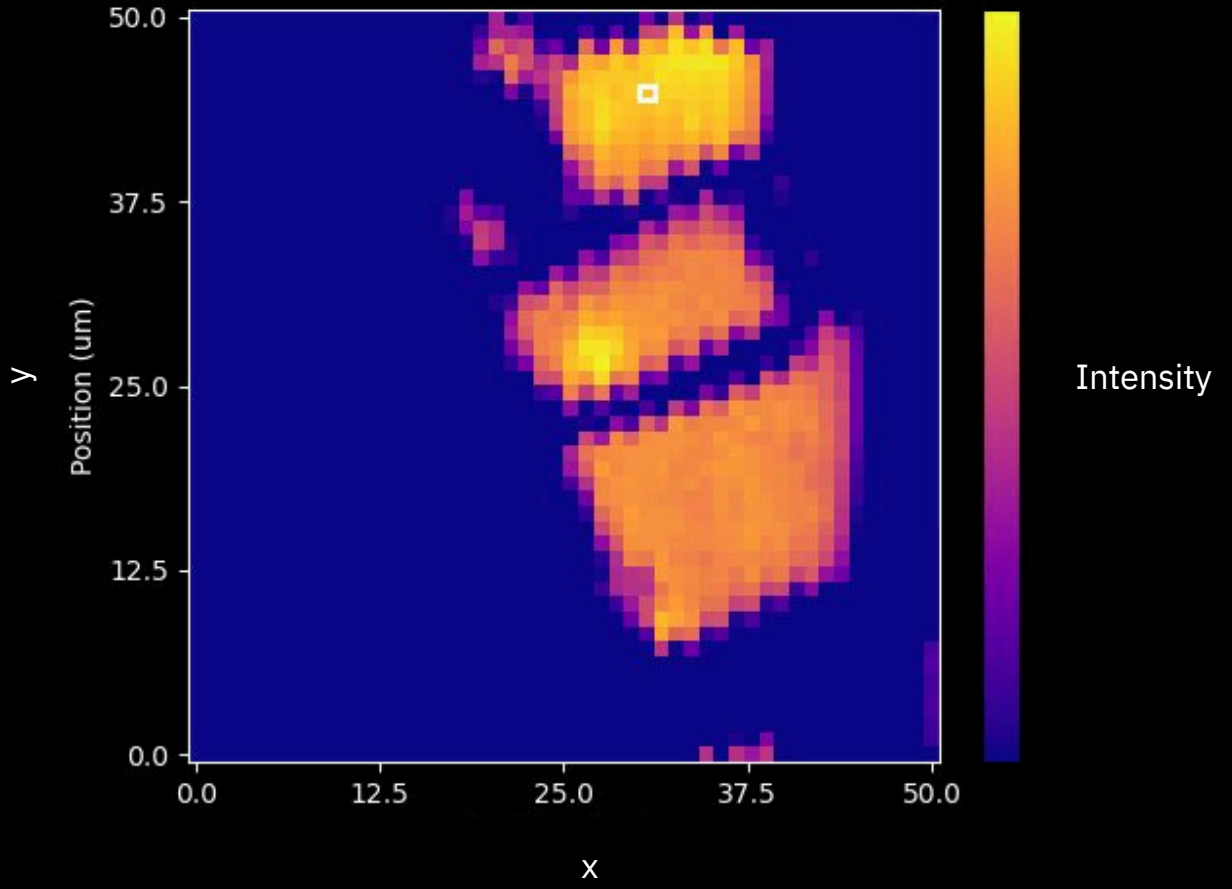
Optical Setup



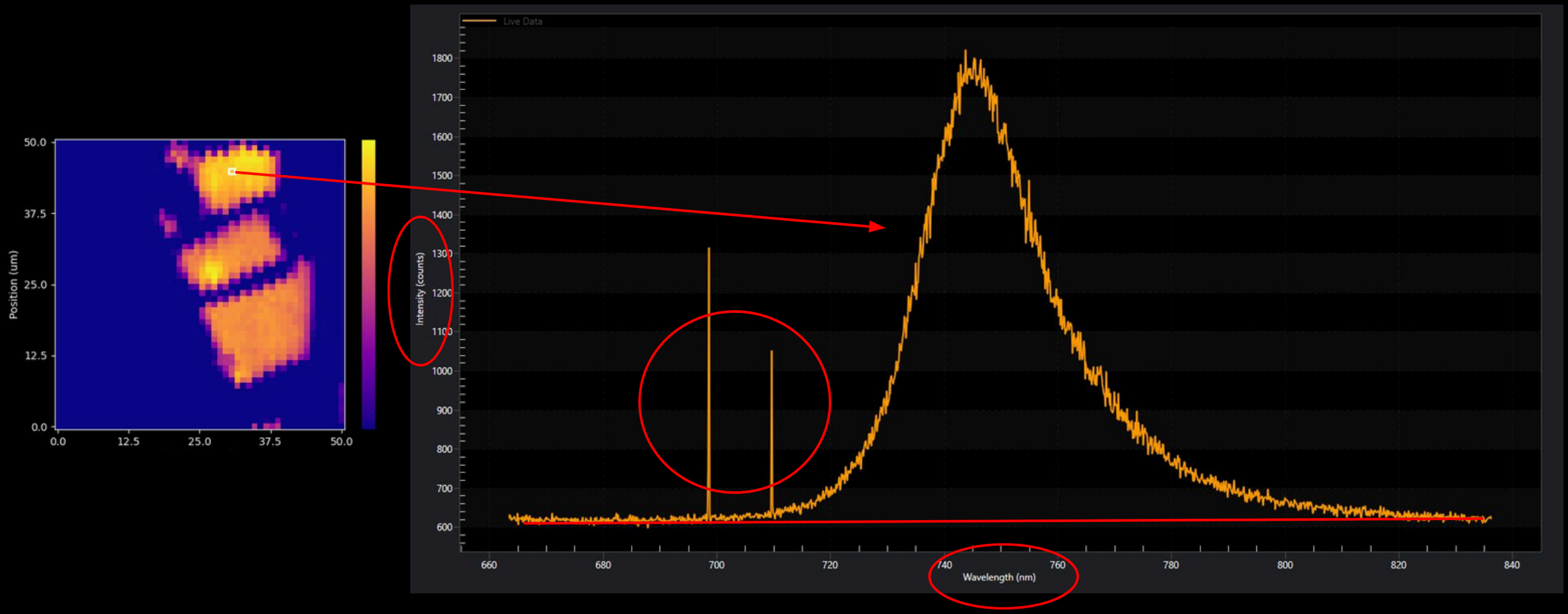
Light Intensity Emitted
Over a Certain Spot

# PL Results

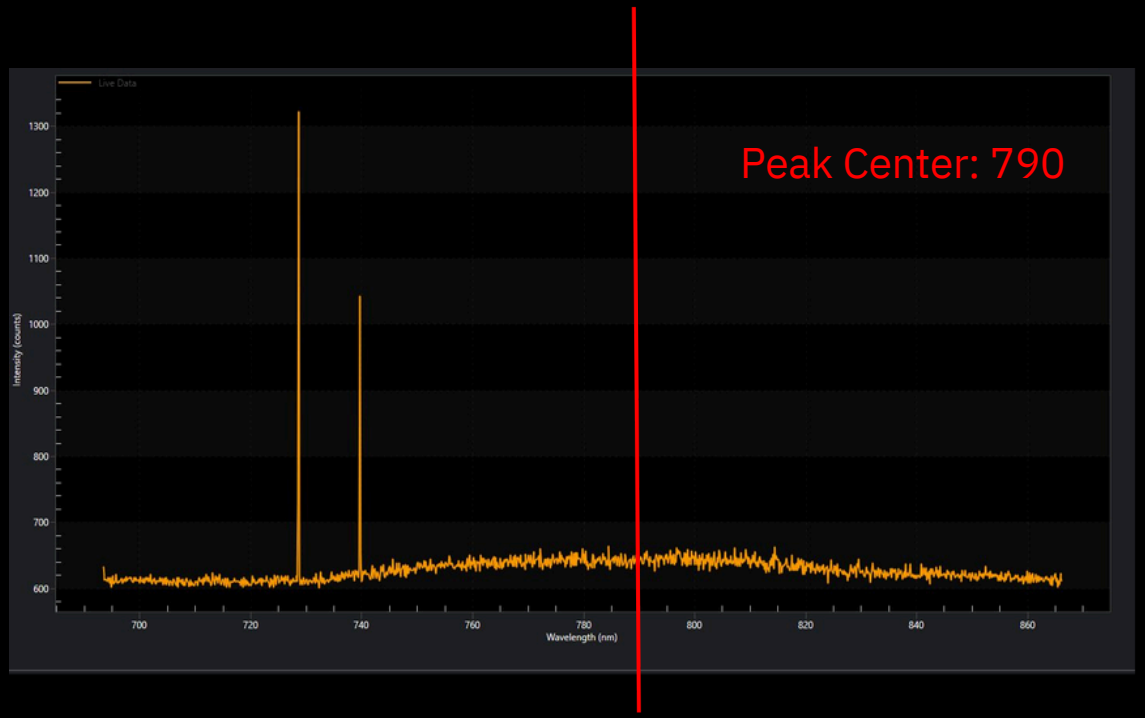
# Photoluminescence Heatmap

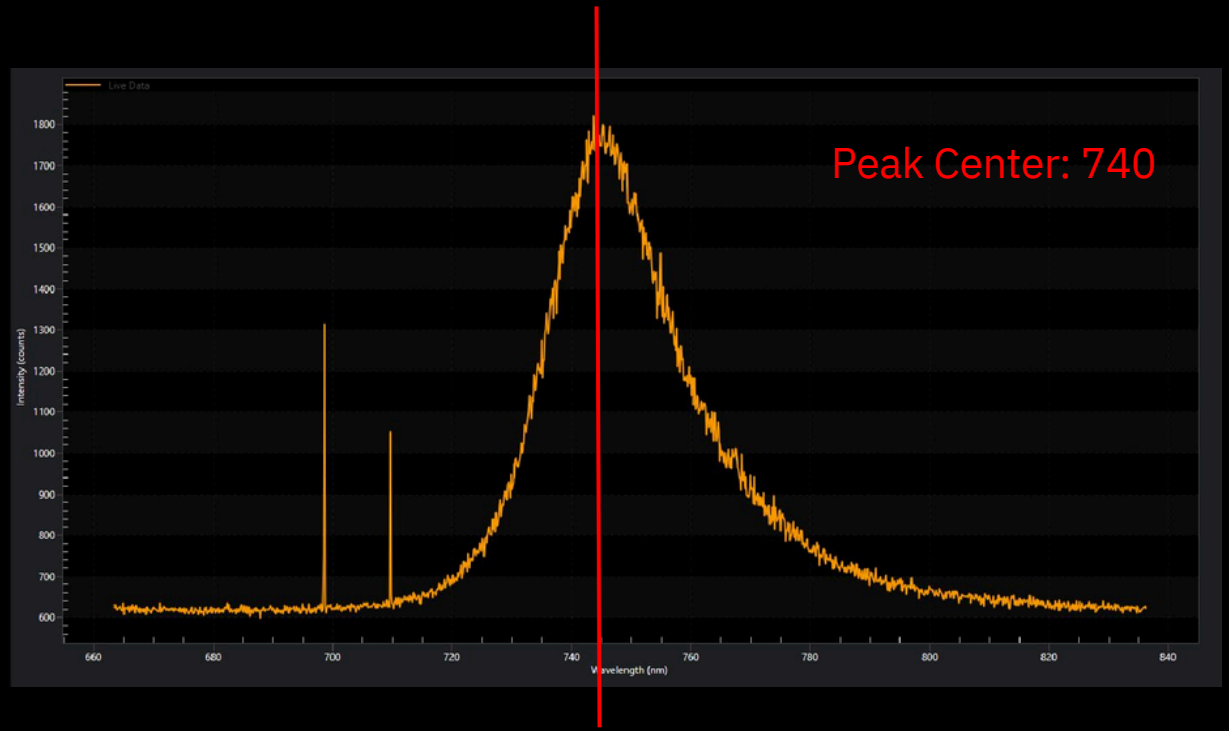
# Individual Spectra Monolayer Analysis



# Peak Comparison - Bilayer/Monolayer

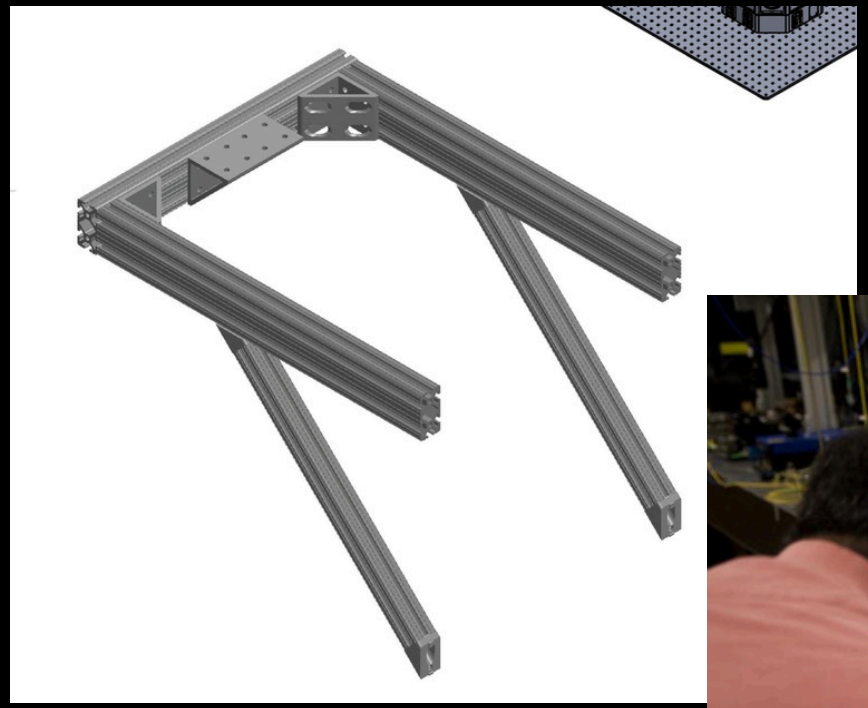


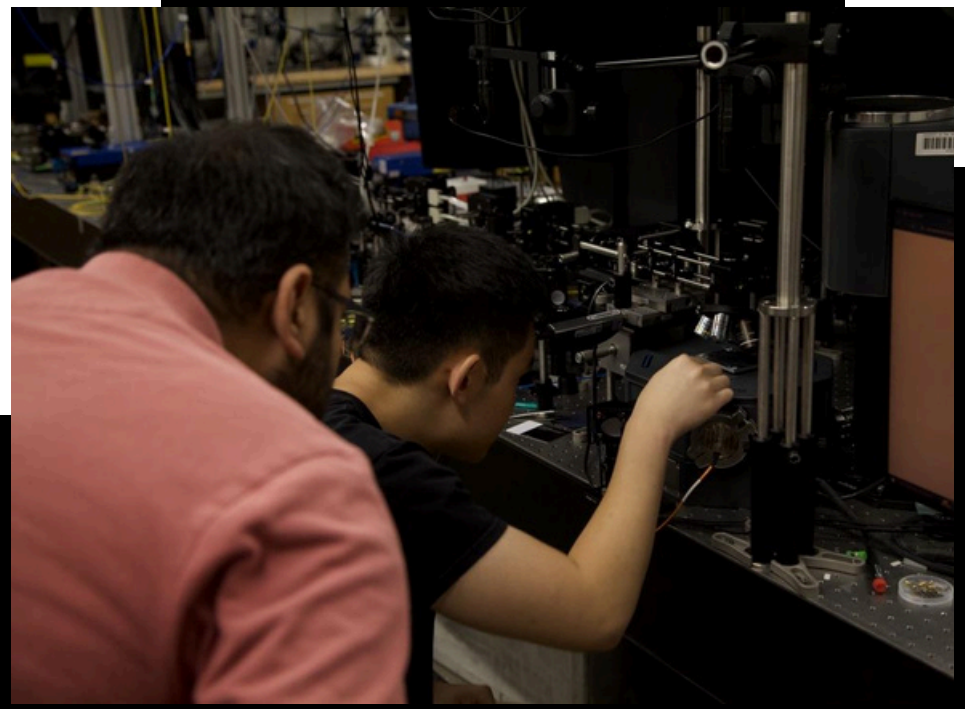

Bilayer

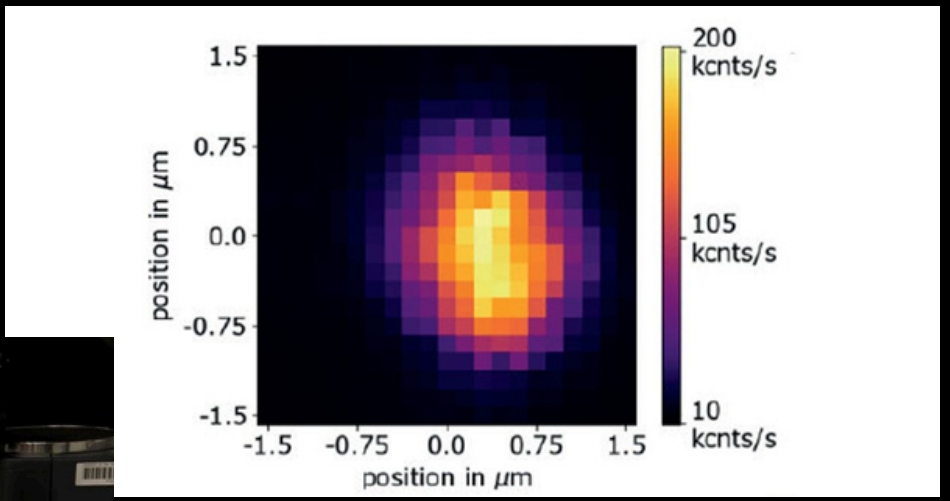



Monolayer

# Additional Takeaways








via Andor Technology

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On behalf of the Moody Lab:

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