



Scattered thoughts around nano-
optics (*with a gold-silver thread*)

Baptiste Augu  
Victoria University of Wellington



Far-field

Tweezers

Photonic crystals

LASER

Quantum optics

Meta-surfaces

chirality

Fibres

Metamaterials

Invisibility cloak

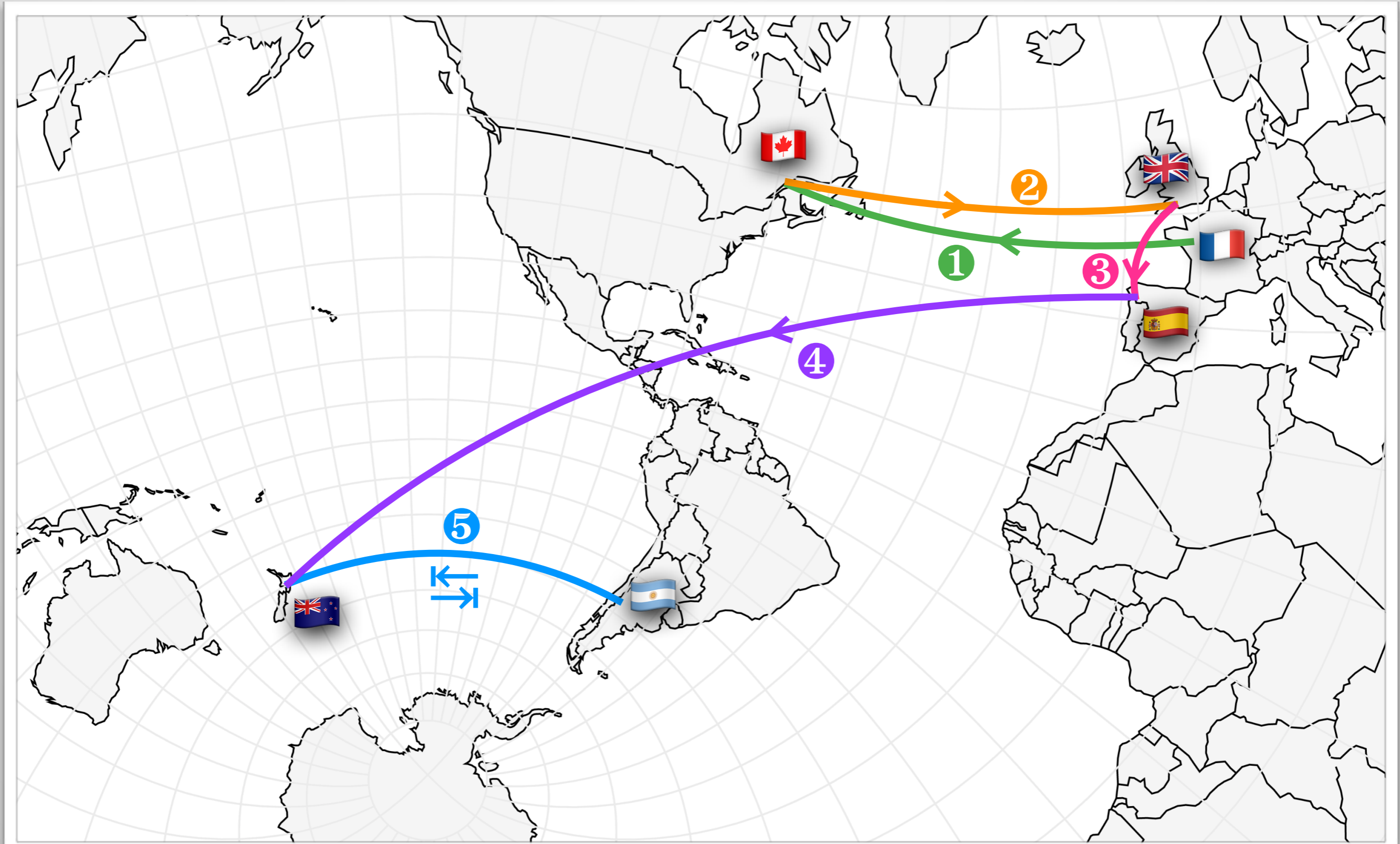
Near-field

TERS, NSOM

Dead branch

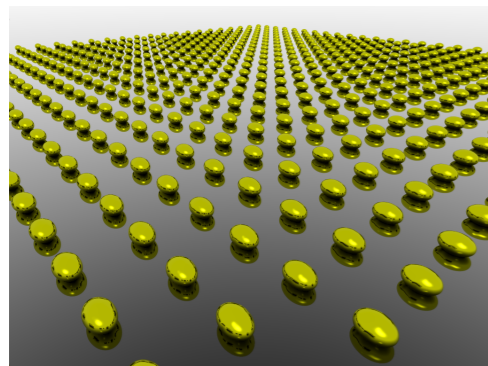
Scattered thoughts around nano-optics (*with a gold-silver thread*)

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Victoria University of Wellington



HIGHLIGHTED PROJECTS

UK



2008

**plasmonic
nanoparticles**

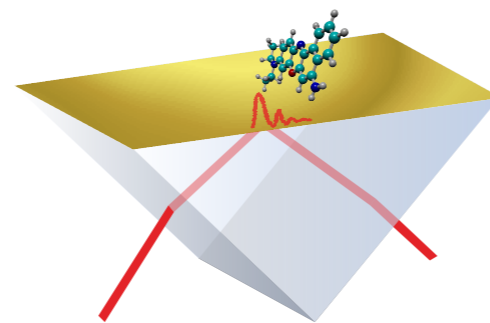
Spain



2011

chirality

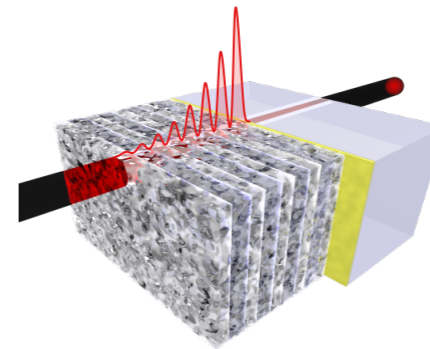
NZ (VUW)



2012–13

SPR + SERS

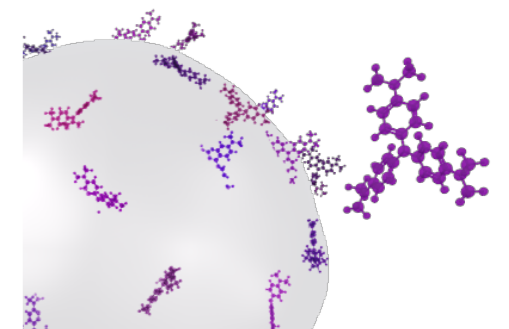
Argentina



2014

**Tamm
plasmons**

VUW | UoA | VUW

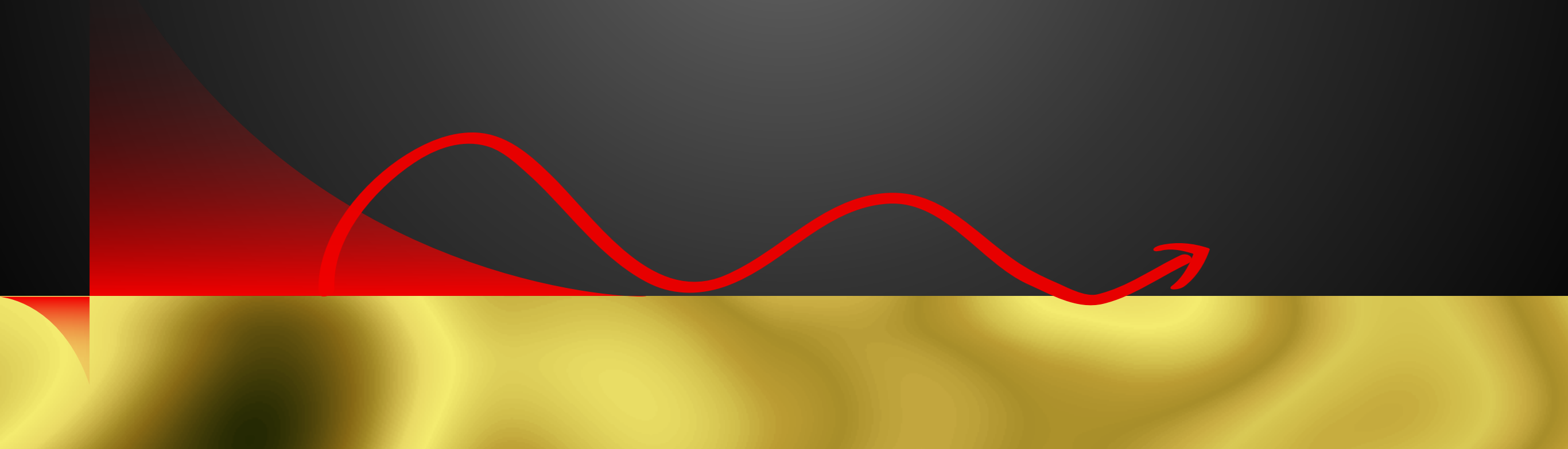


2015 –

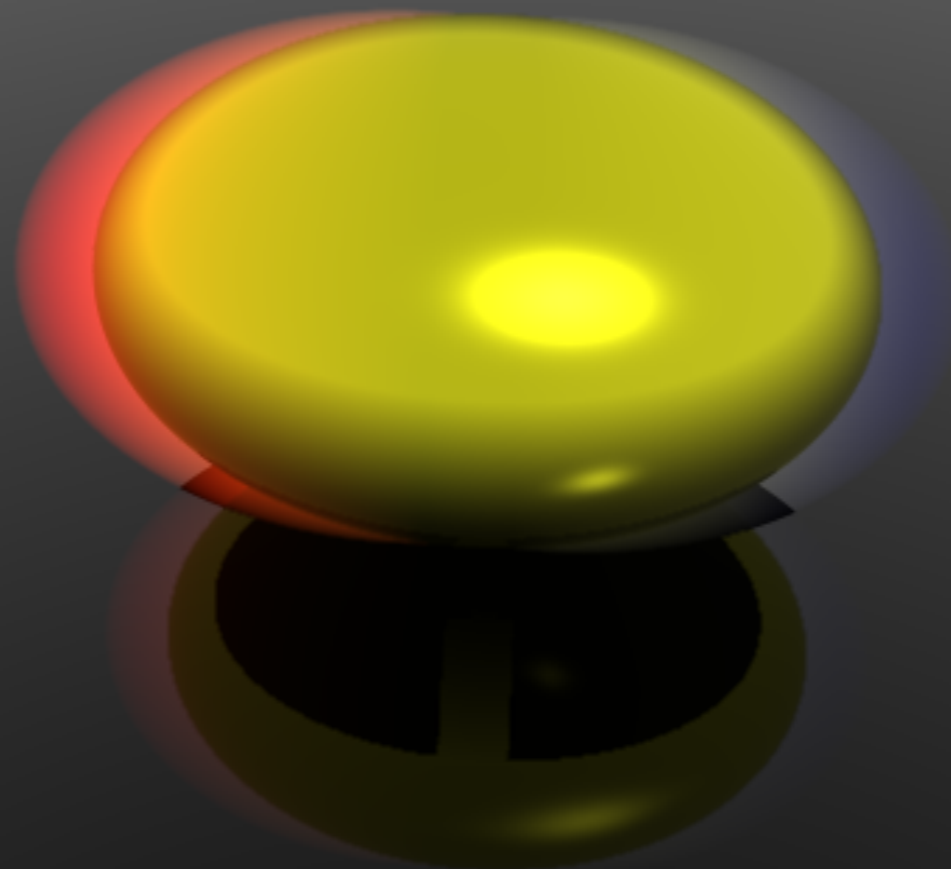
(continued) ...

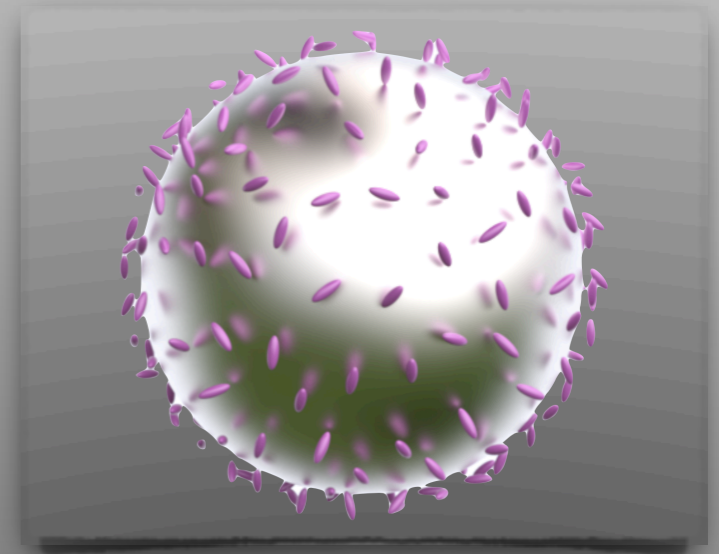
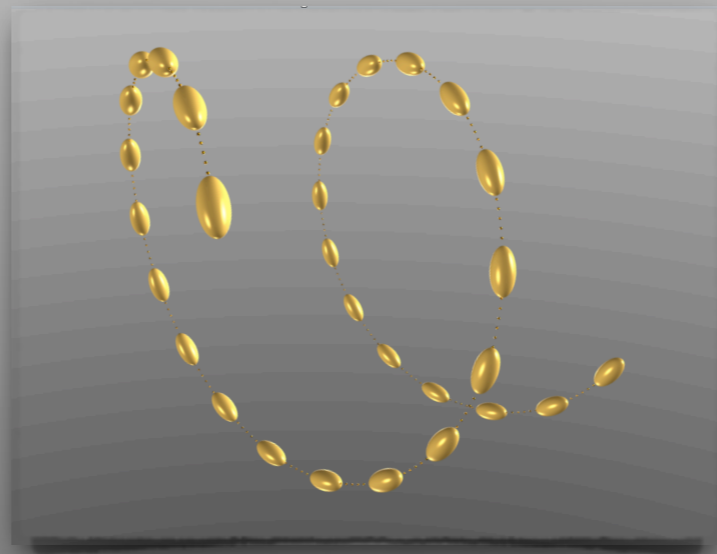
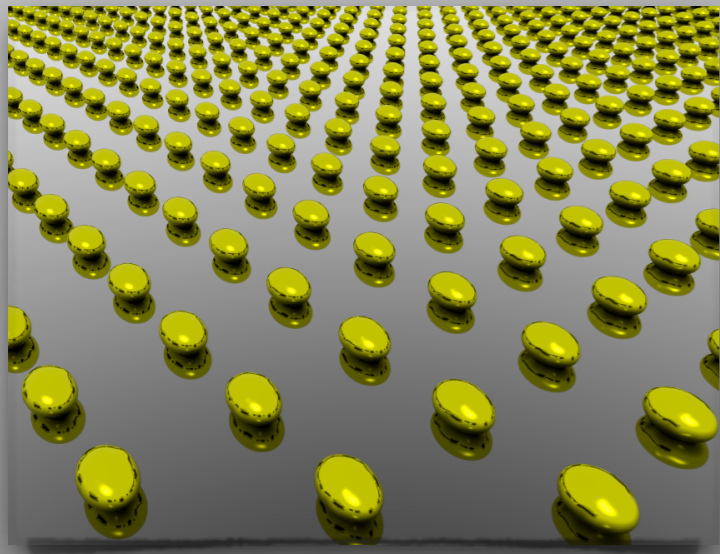
WHY PLASMONICS?

- ✓ spatial confinement
- ✓ field enhancement

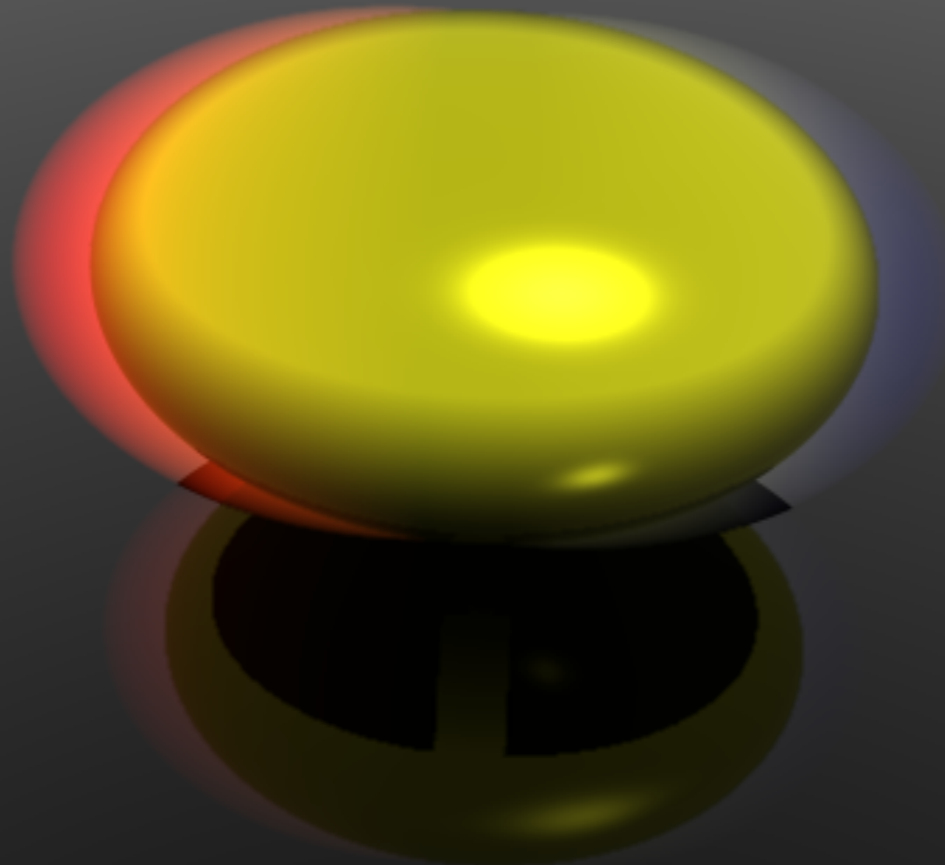


“NANO ANTENNA”

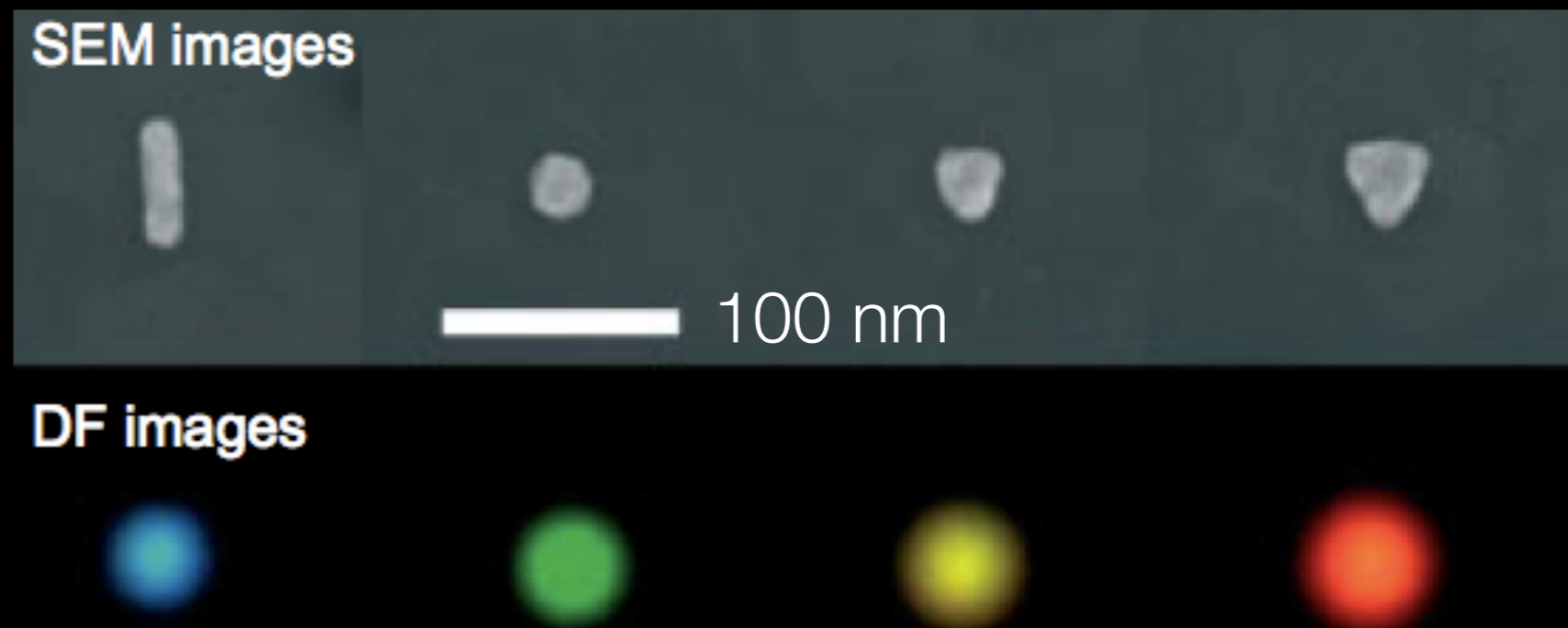
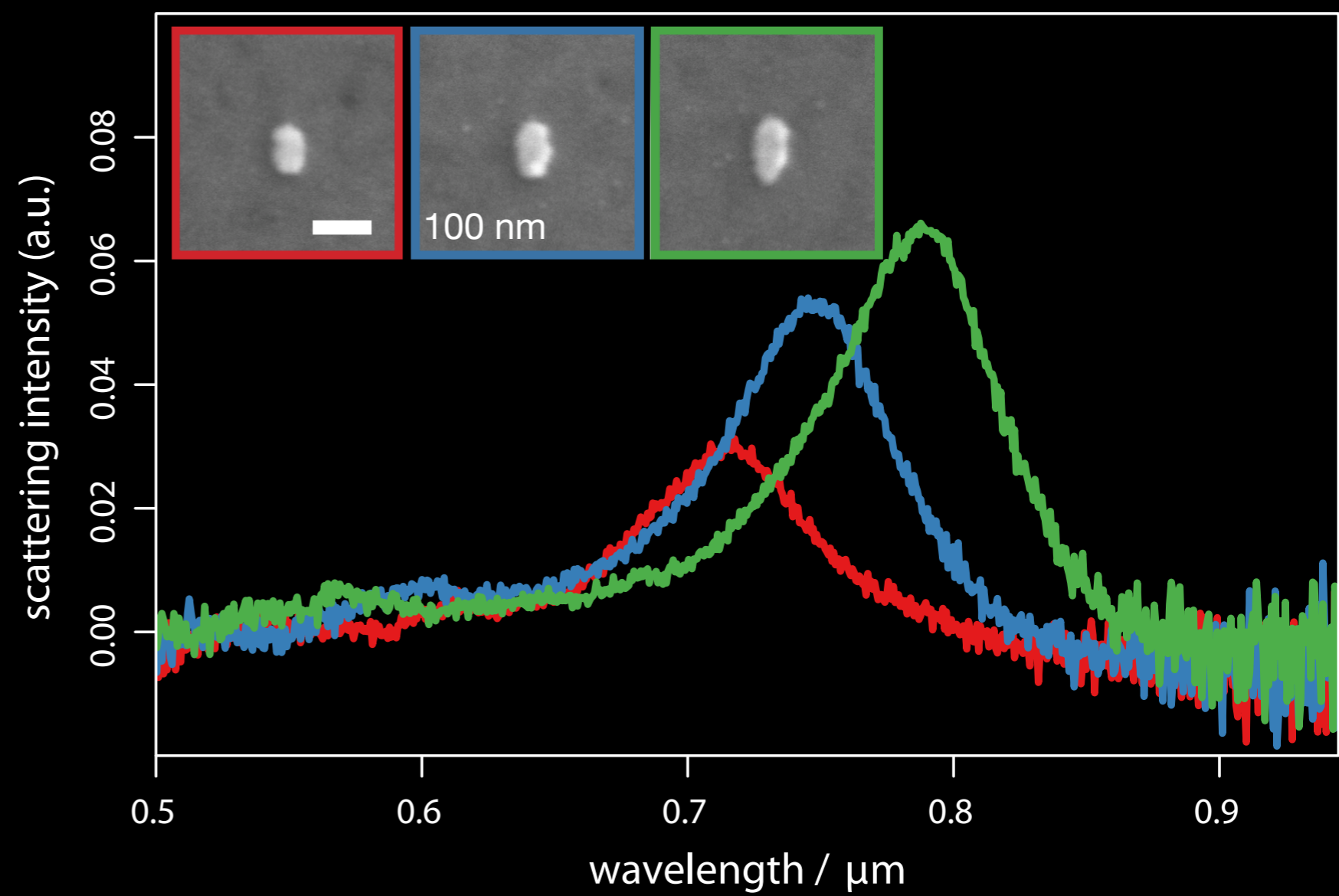
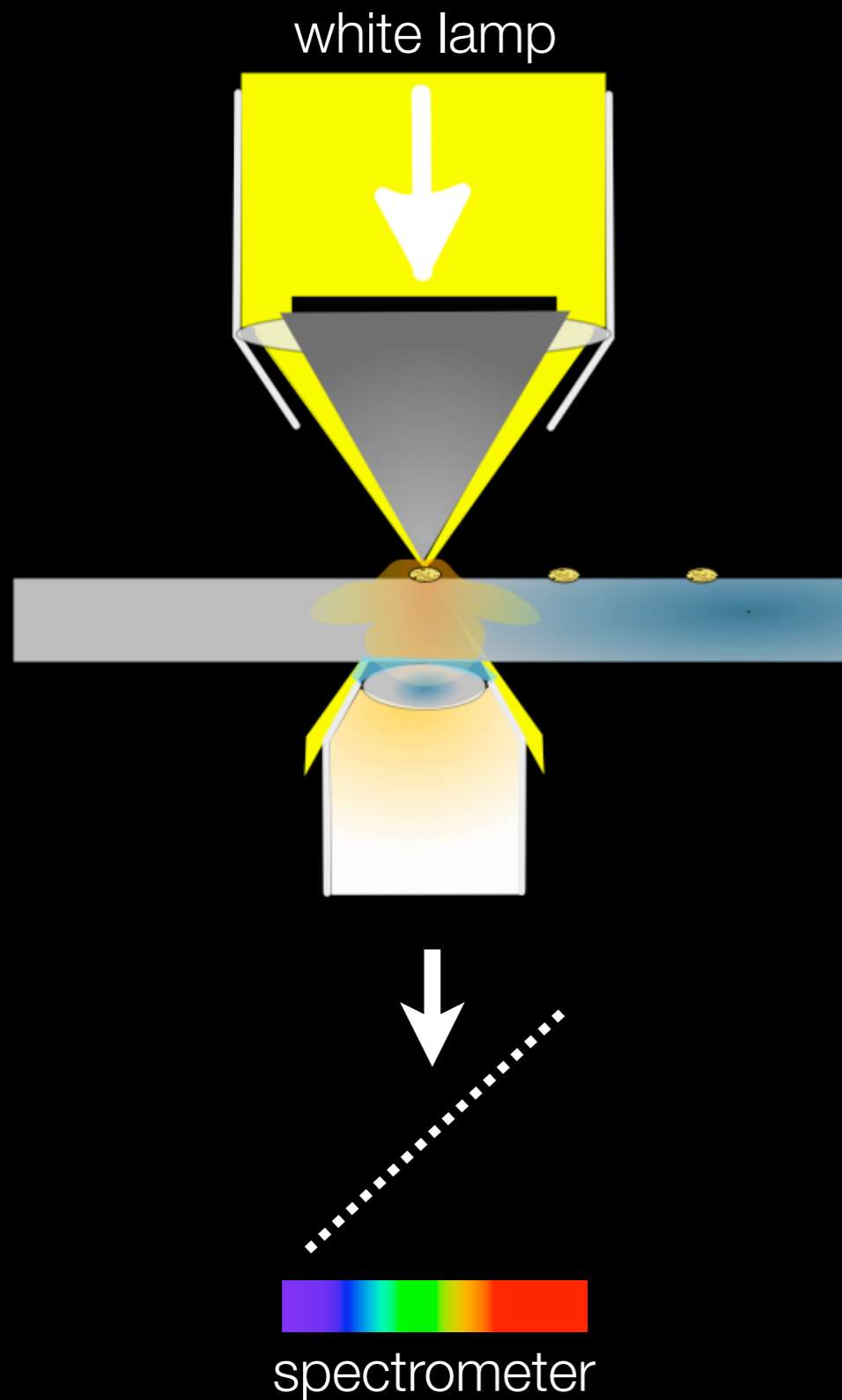




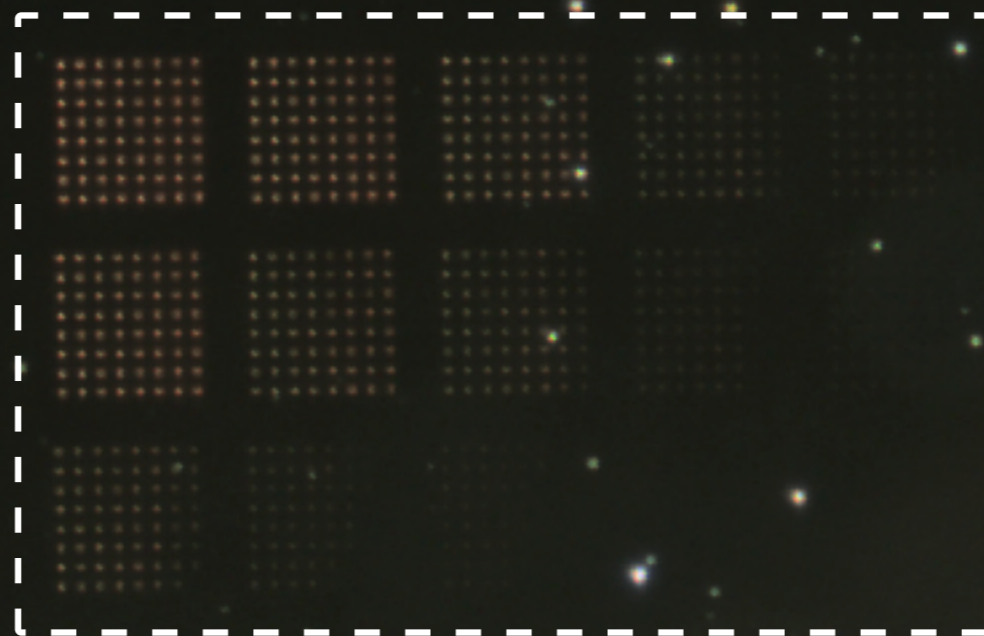
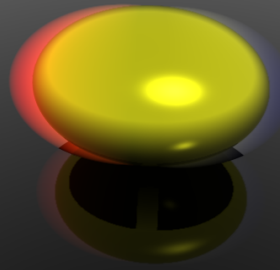
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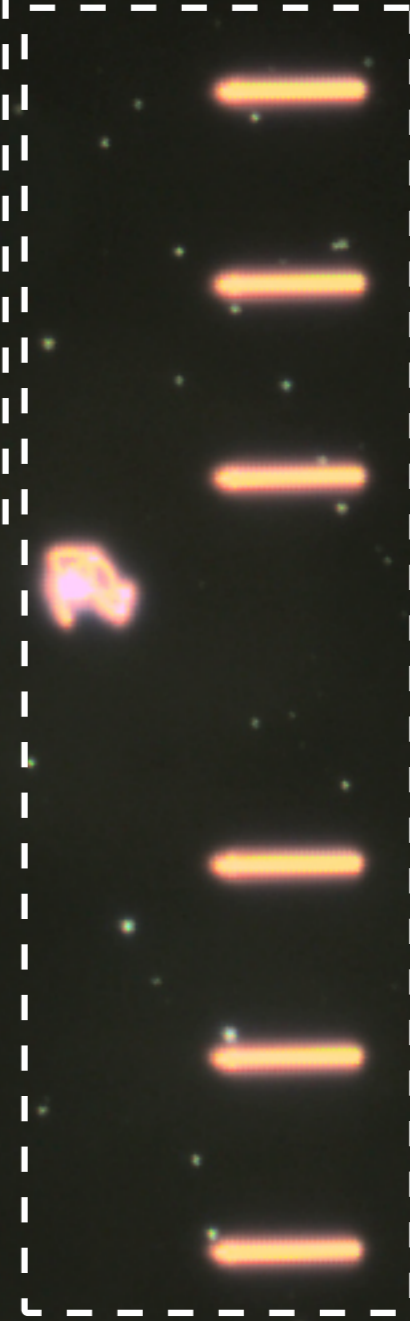
“NANO ANTENNAS”



“NANO ANTENNA”



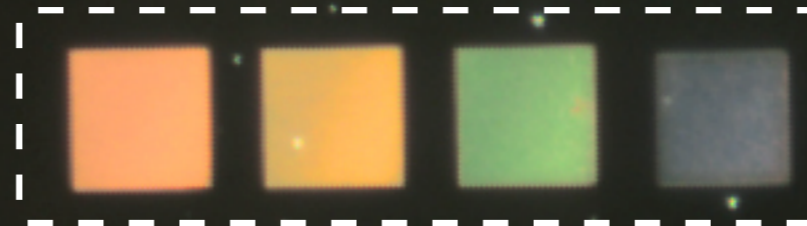
single particles



marks

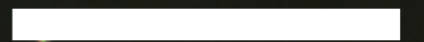
flake

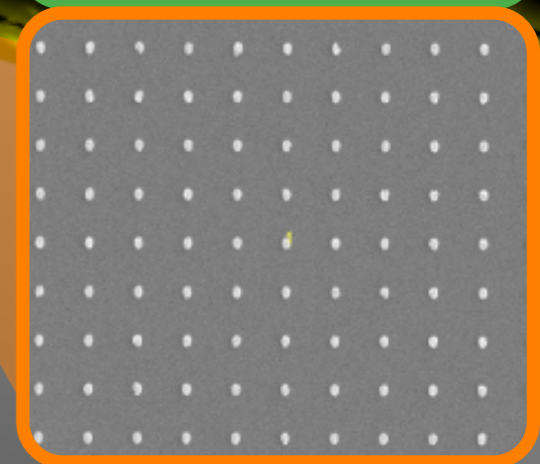
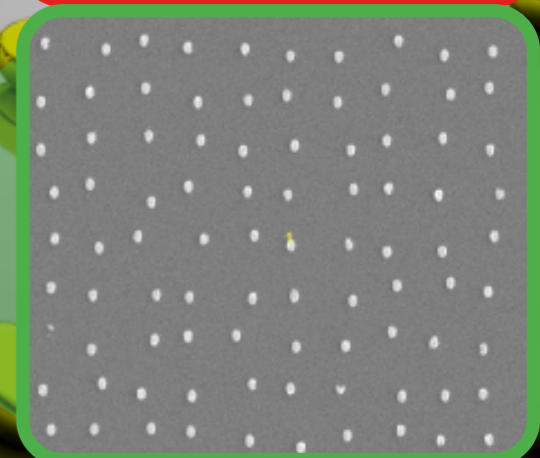
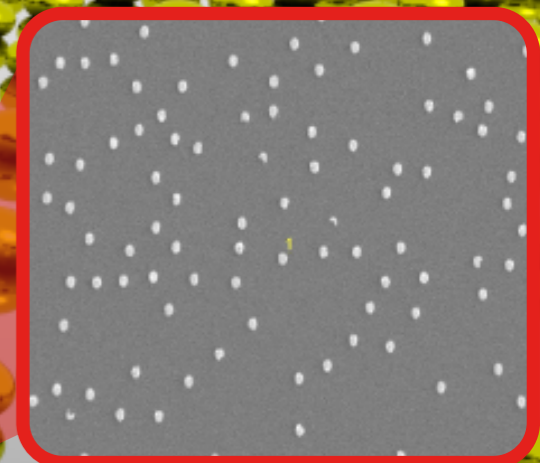
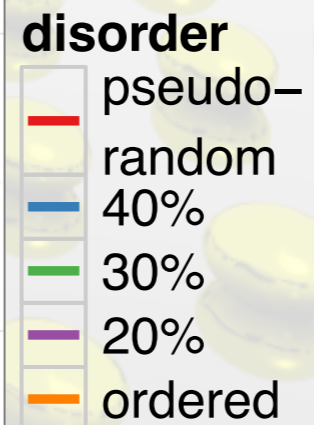
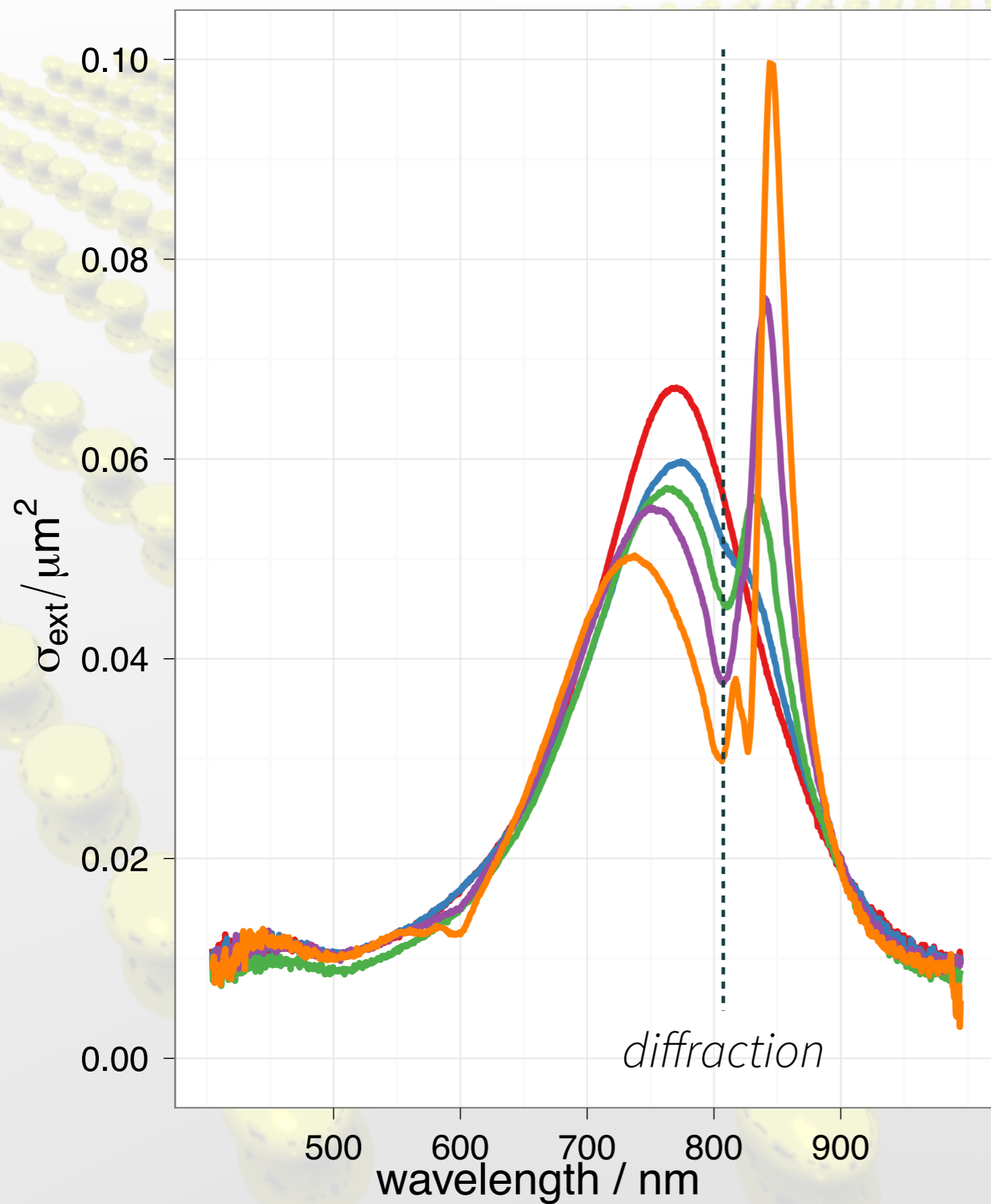
dust



diffractive arrays

100 μ m





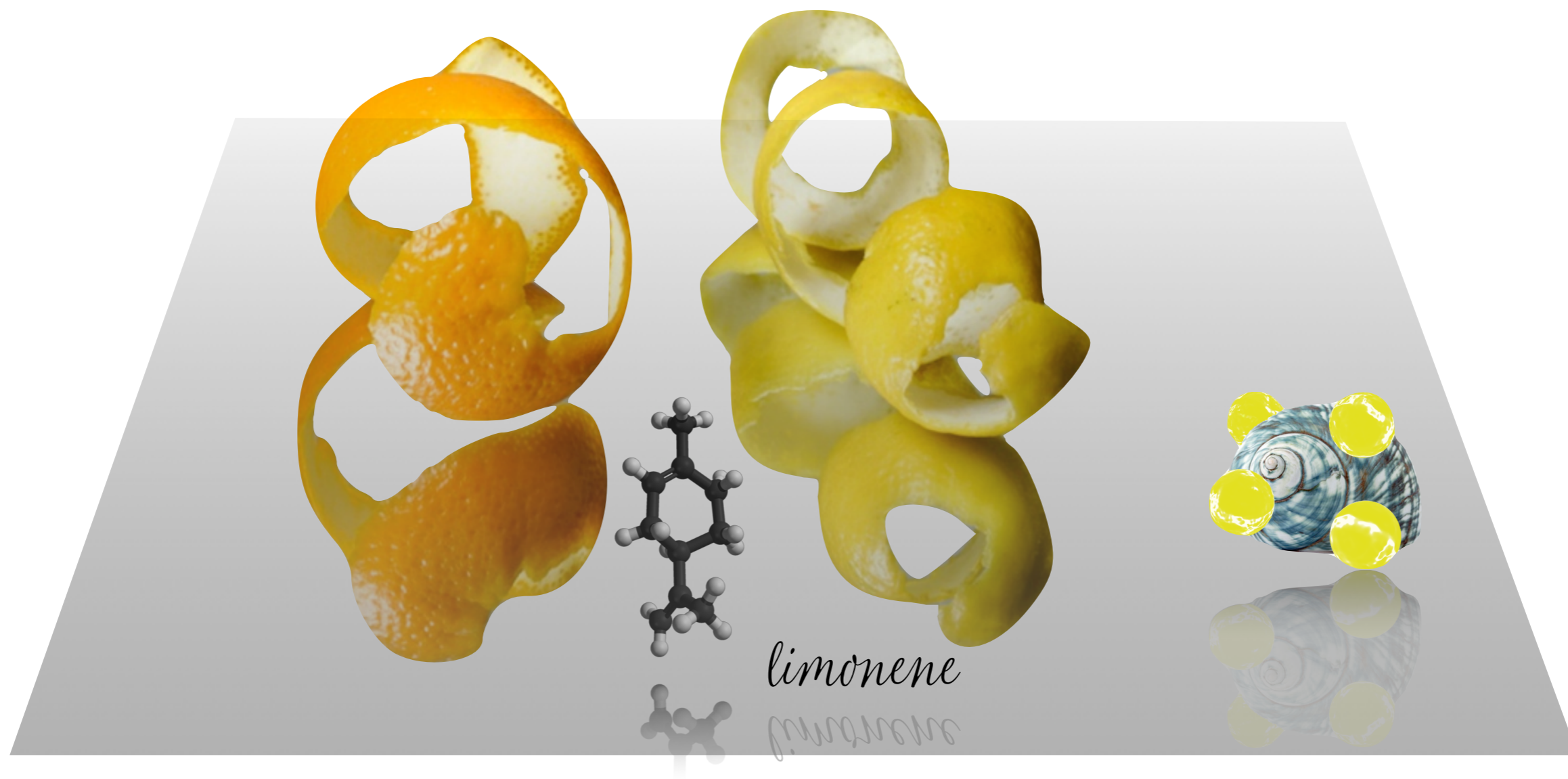


RUTHERFORD
DISCOVERY FELLOWSHIPS

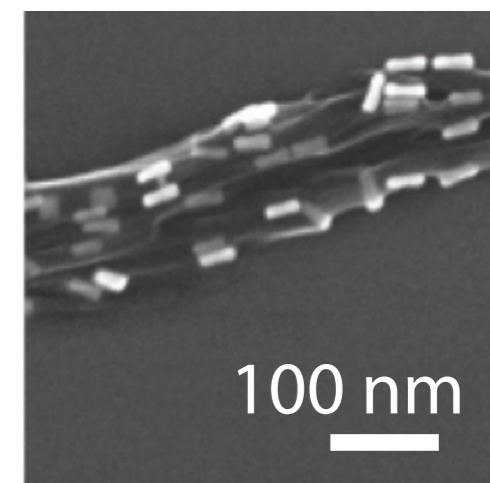
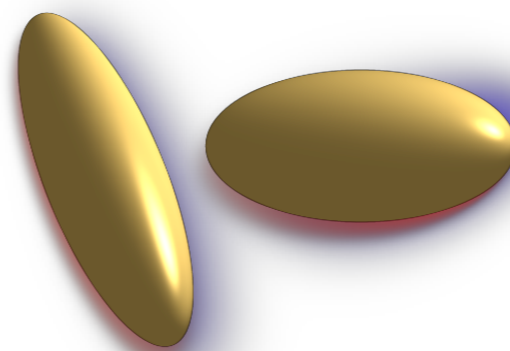
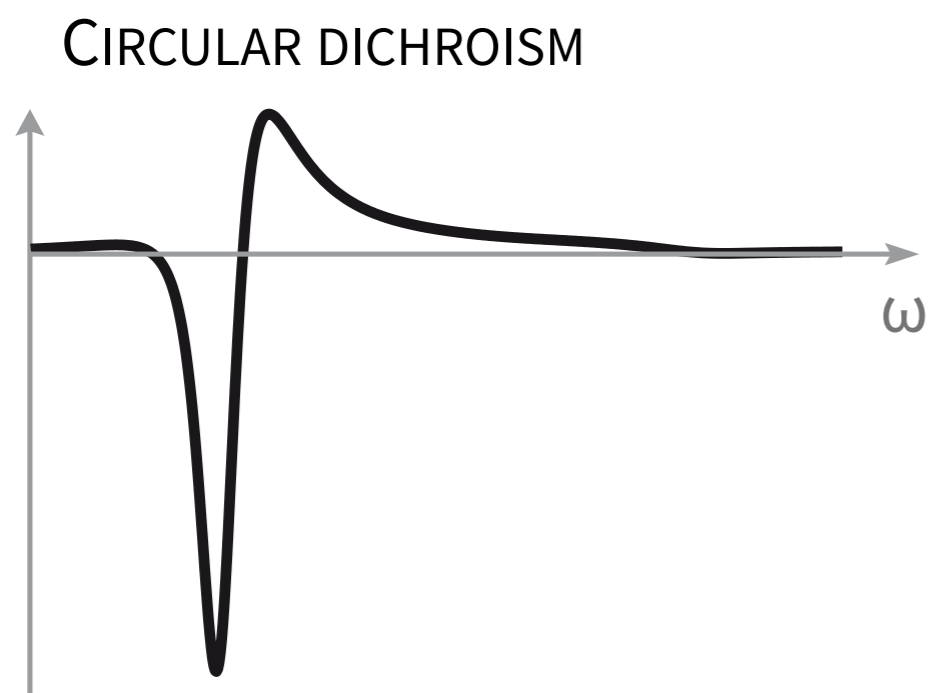
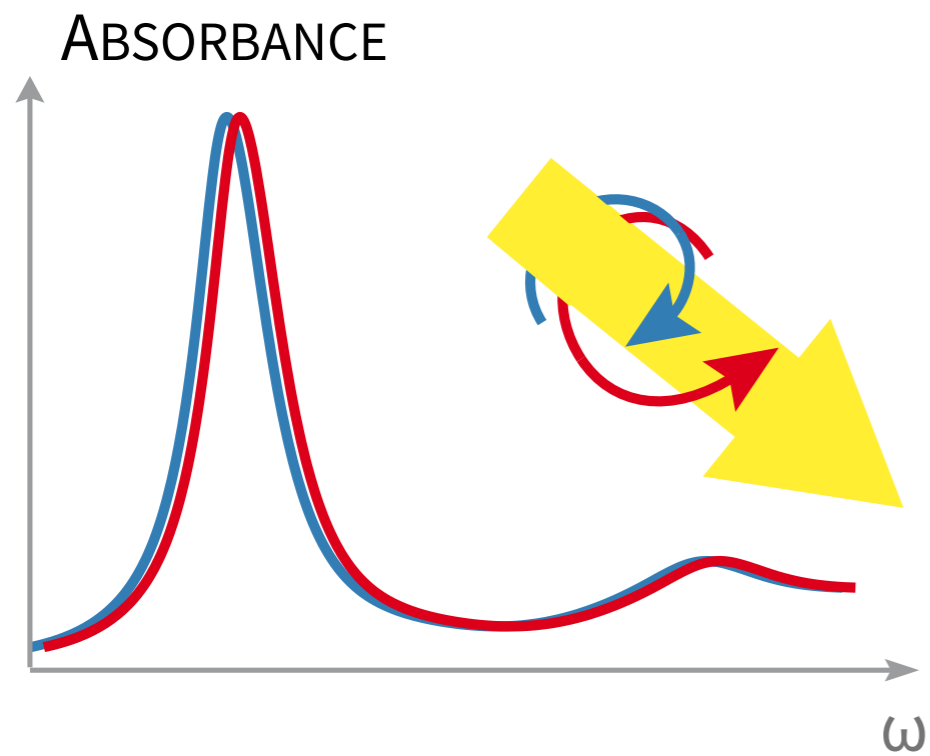


LIGHT AND CHIRALITY AT THE NANOSCALE

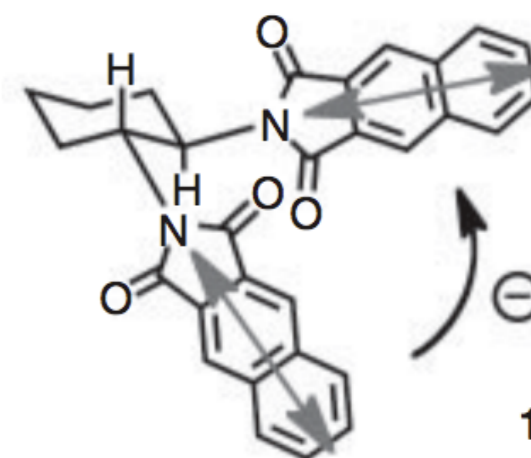
SQUEEZING OUT 3D INFORMATION *with light*



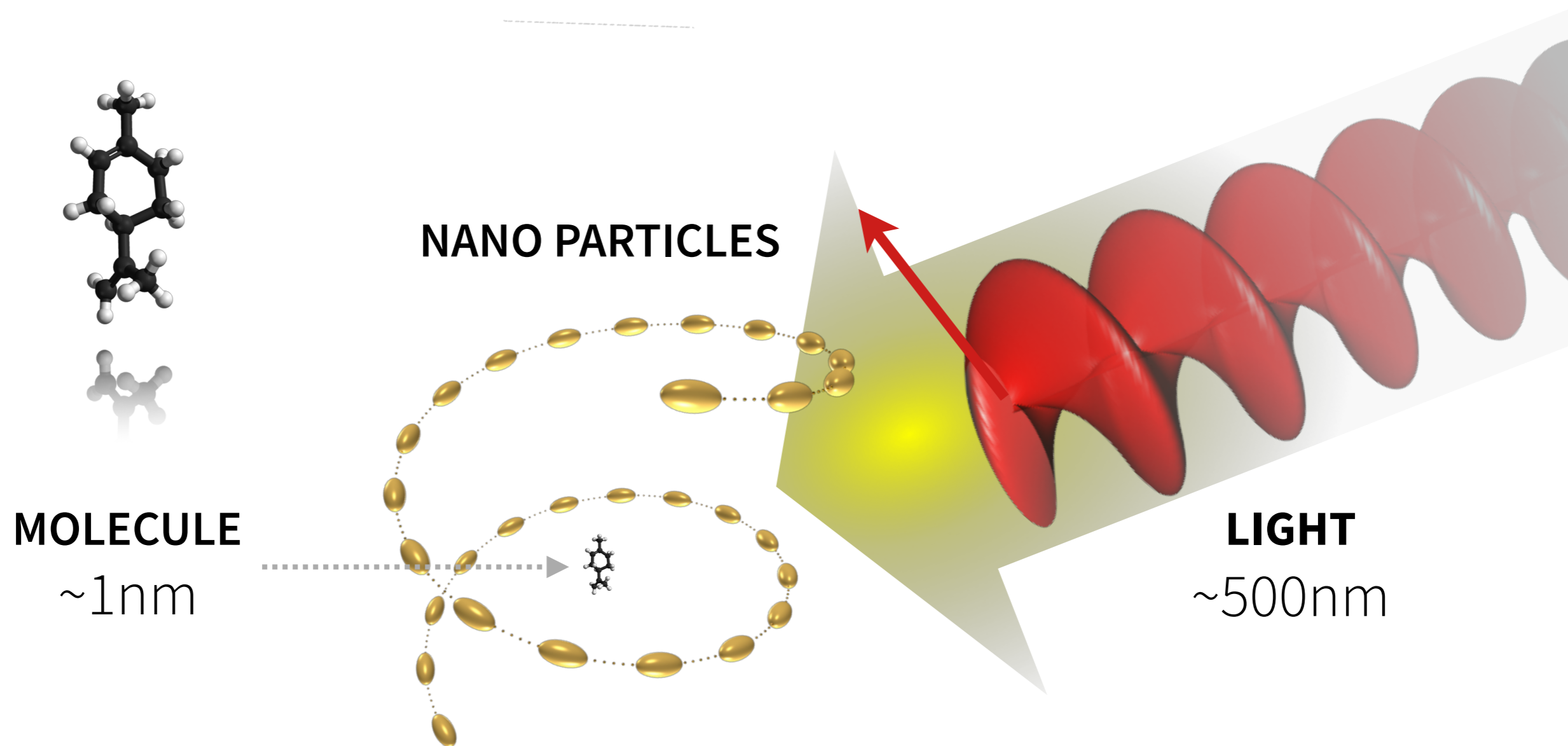
FINGERS CROSSED



mimicking “exciton coupling”



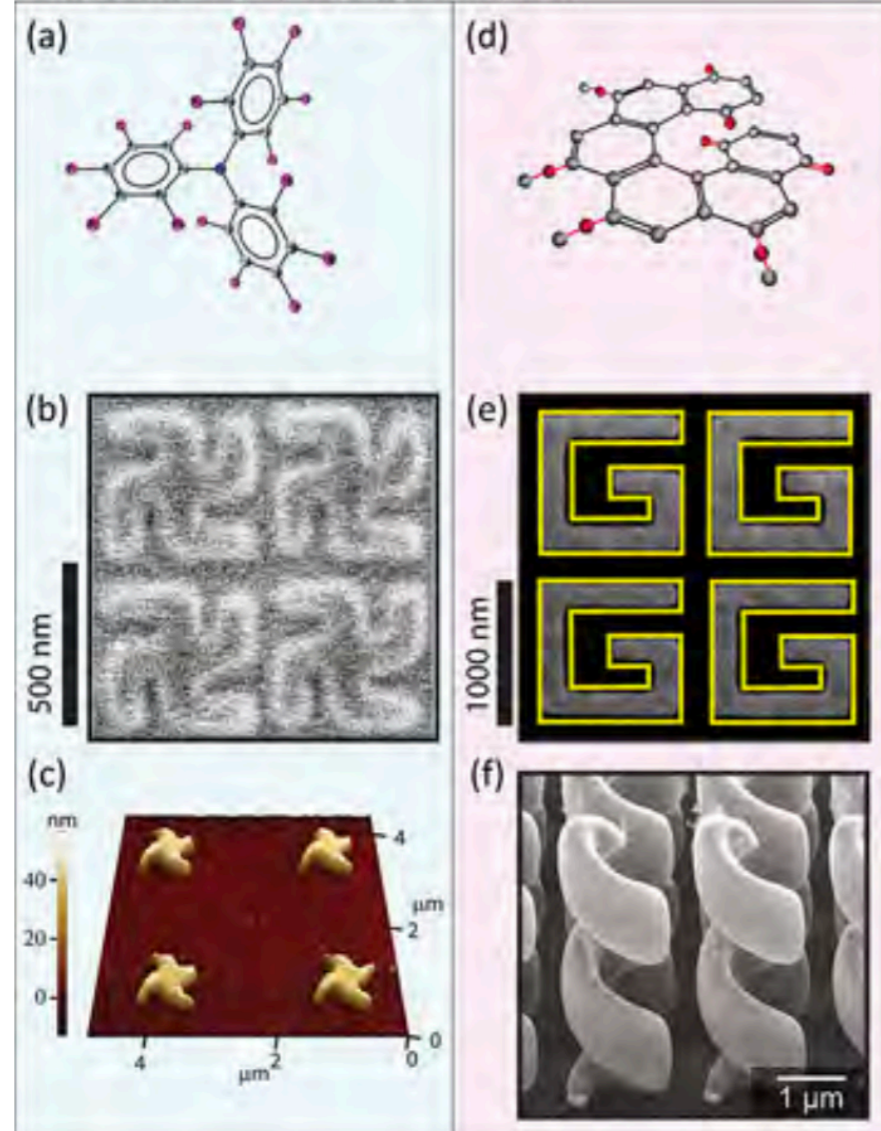
BRIDGING THE GAP WITH NANO-ANTENNAS



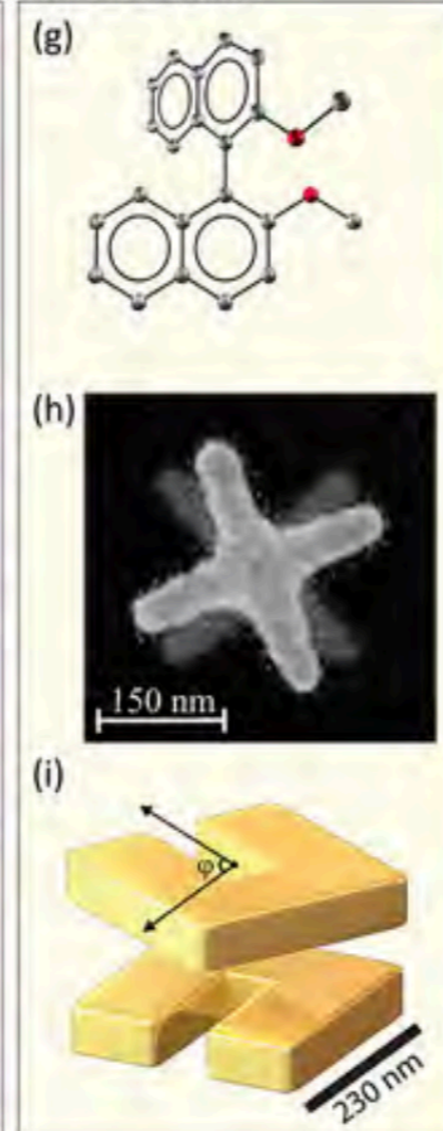
A CORNUCOPIA OF CHIROPTICAL SYSTEMS



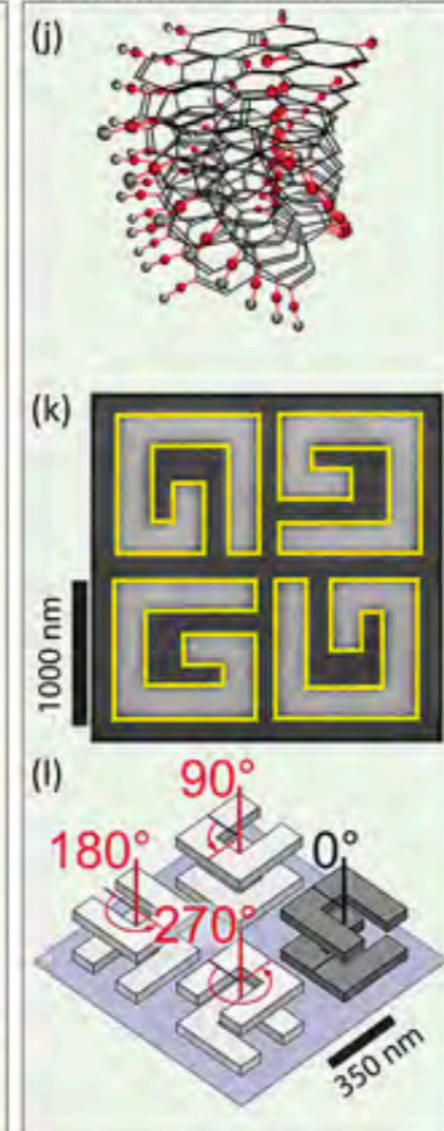
Helical chirality: propellers & spirals



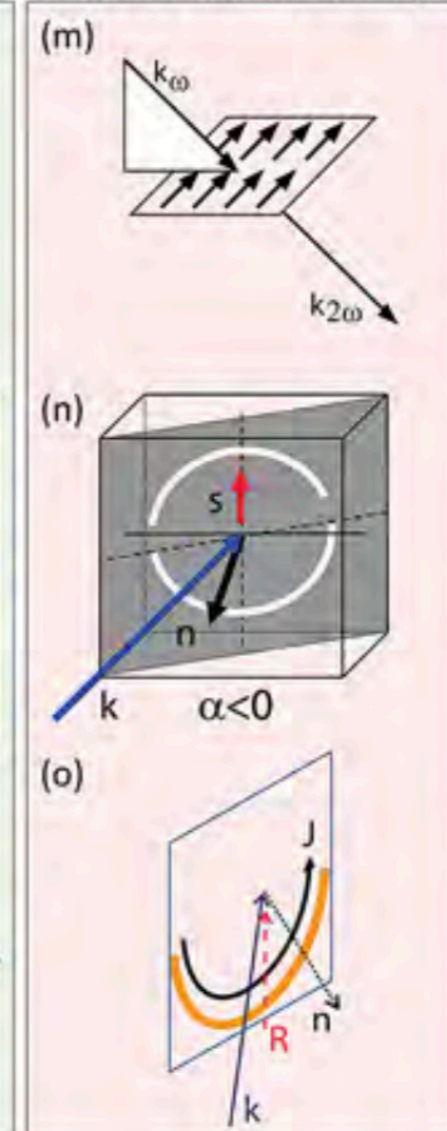
Chiral coupling



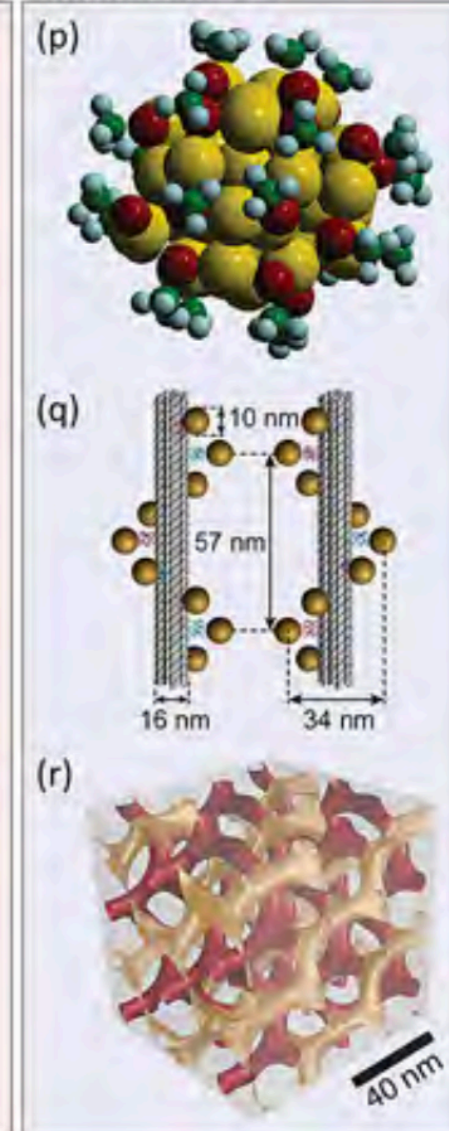
Supramolecular chirality



Pseudo/extrinsic chirality

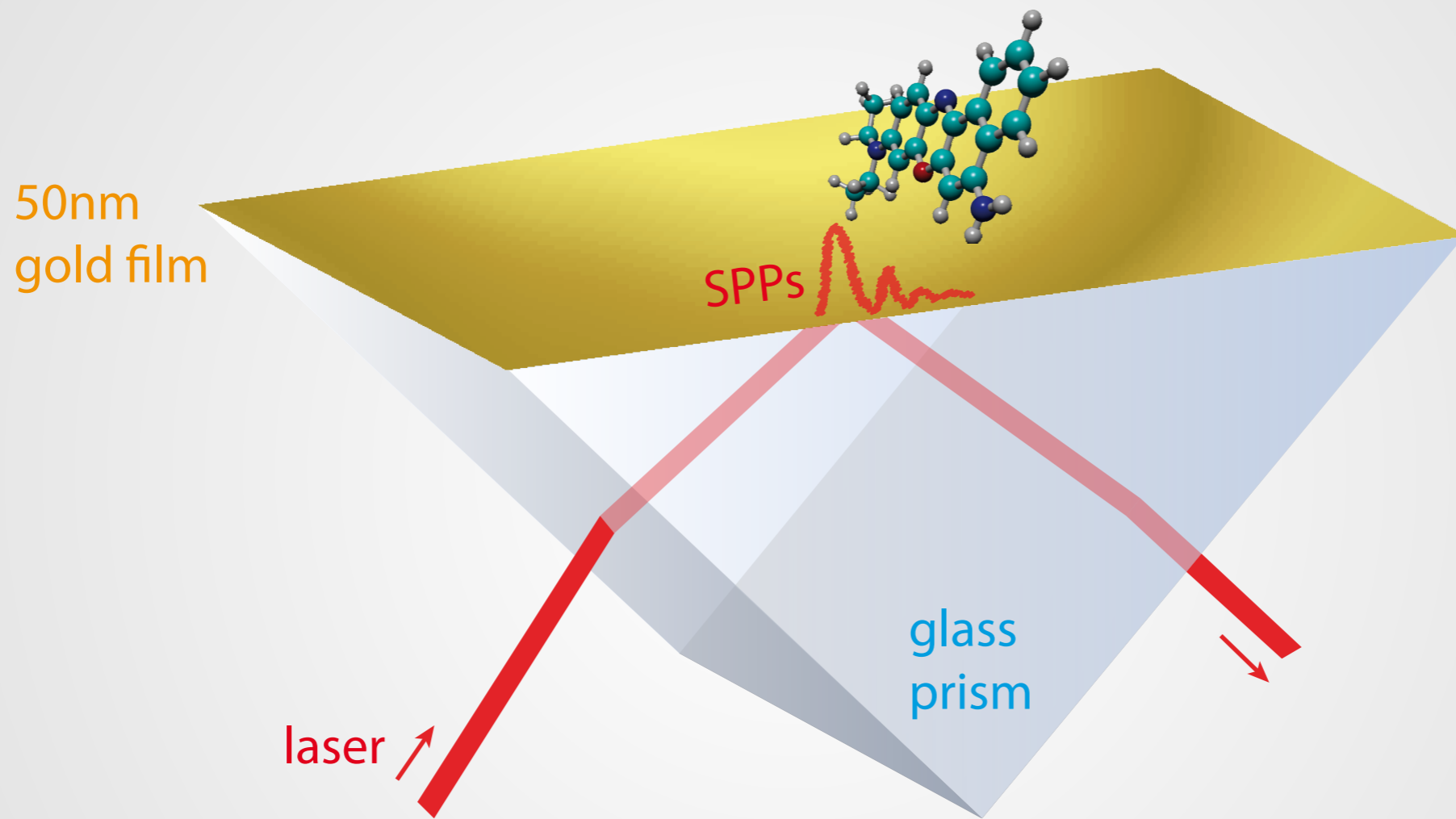


Chiral scaffolds



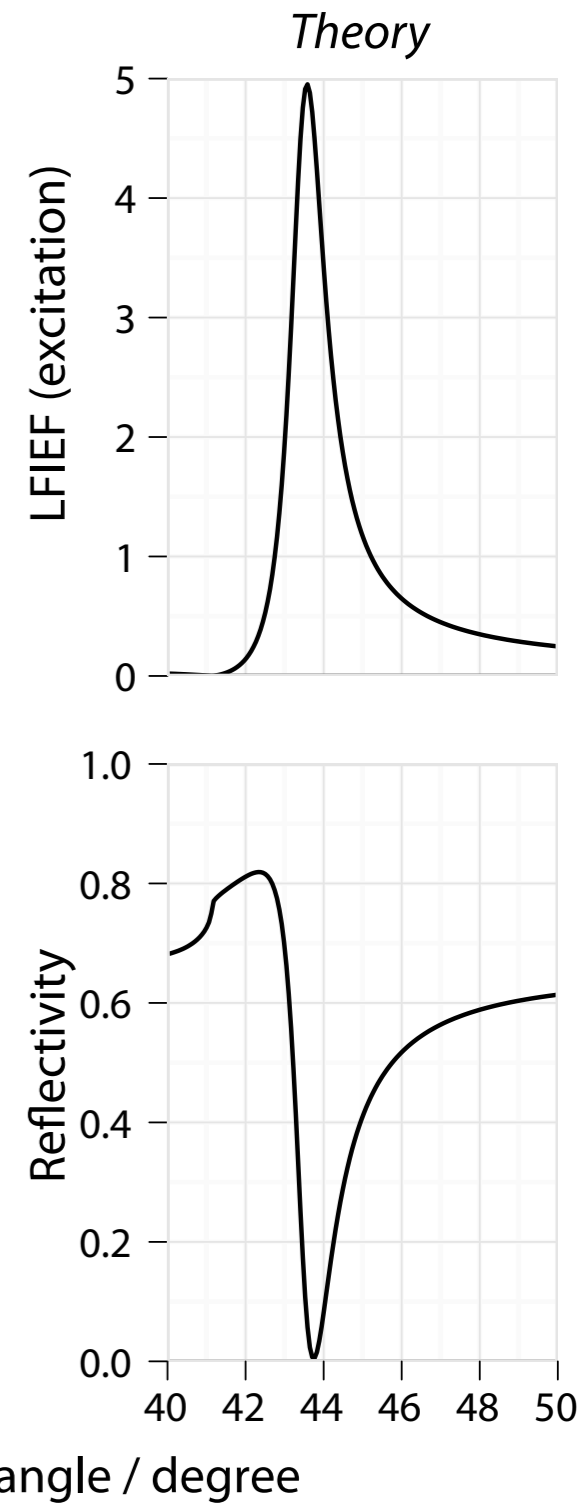
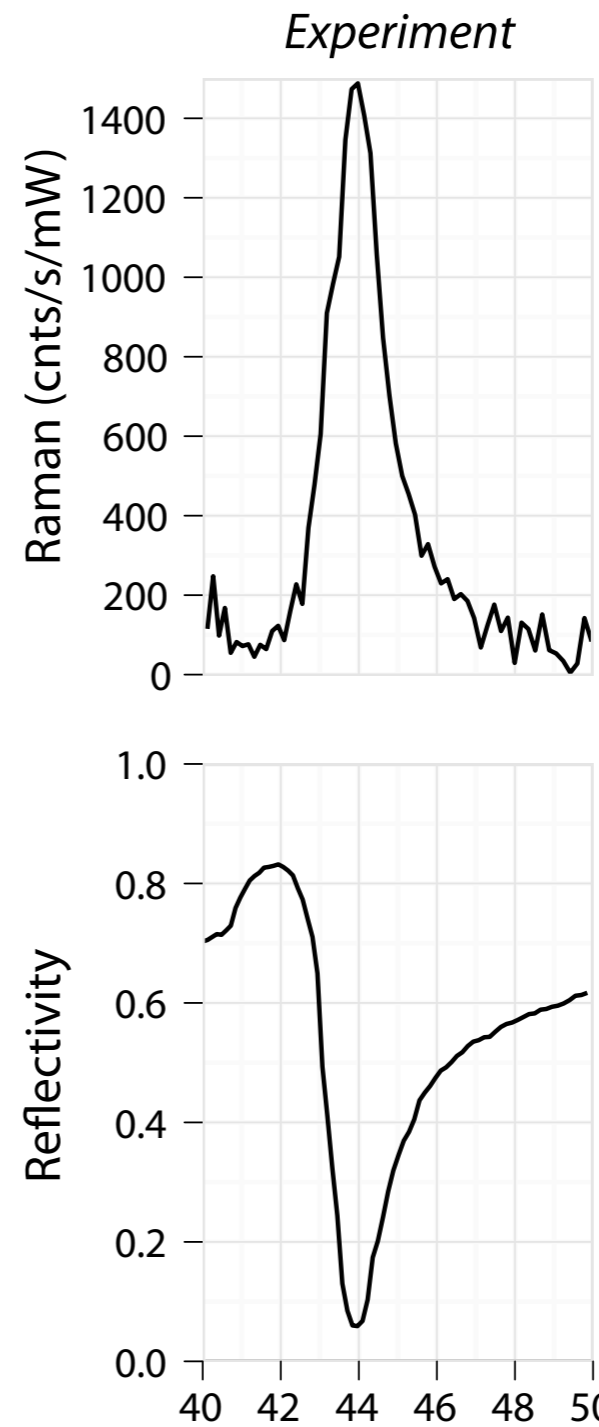
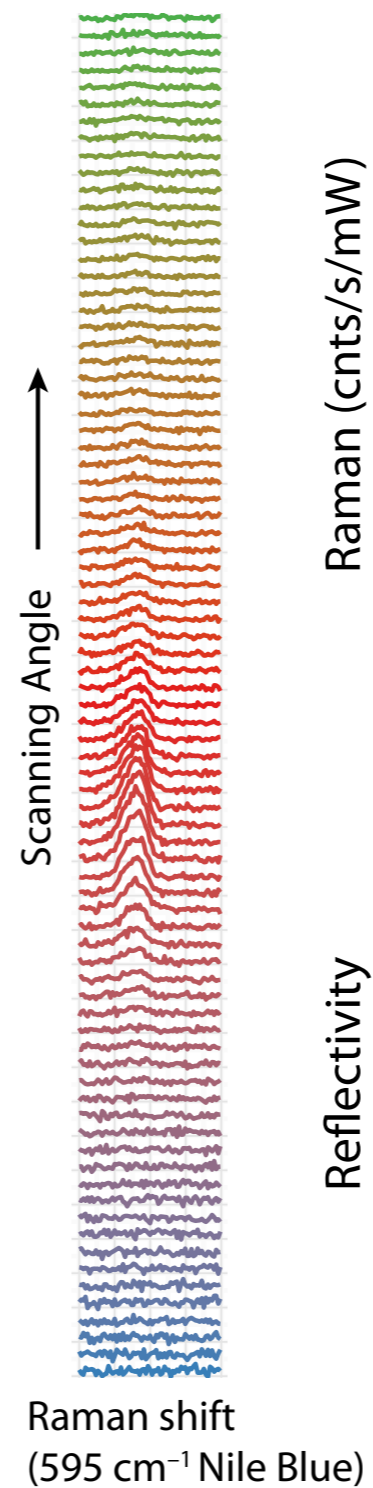
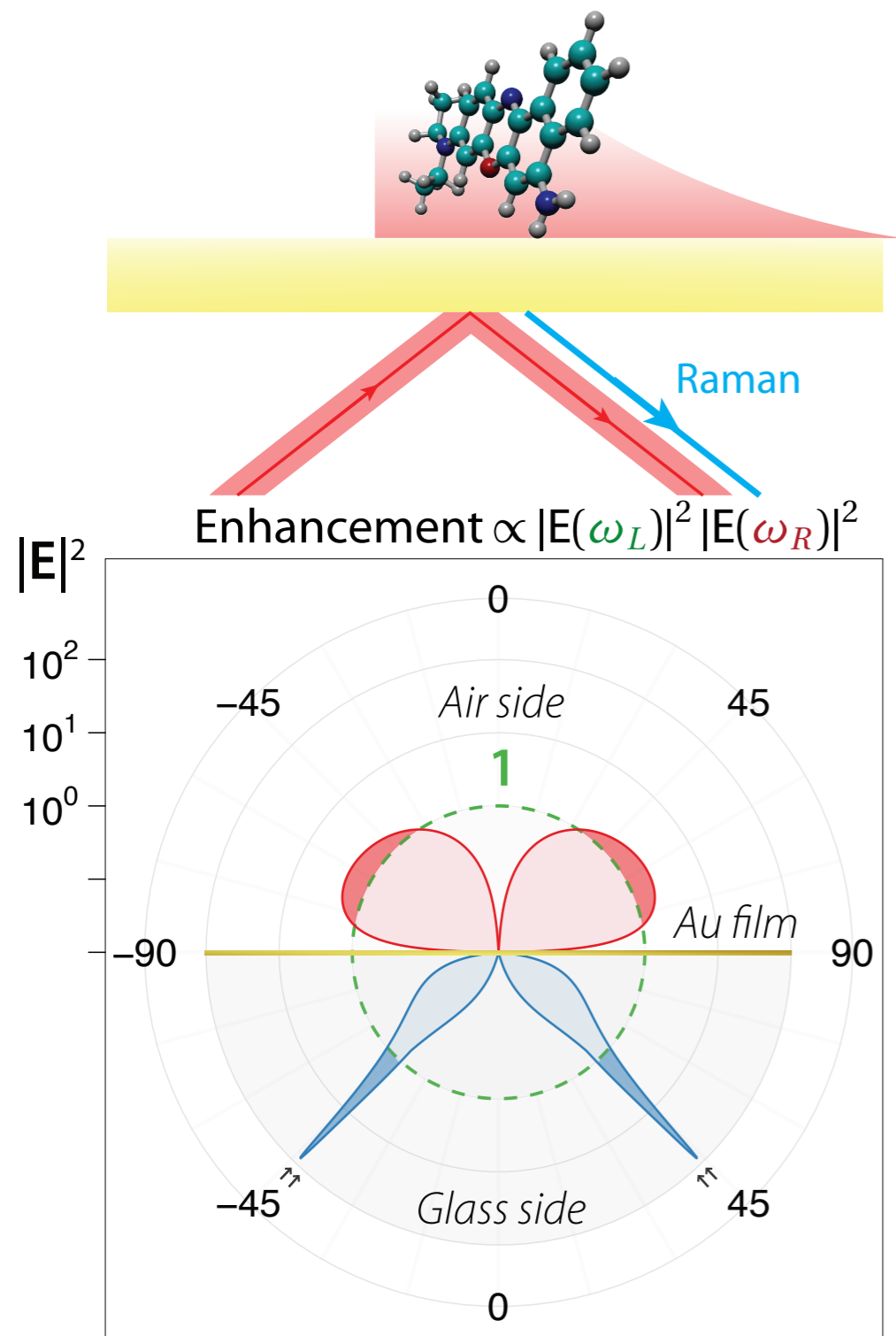
2. PLANAR MULTILAYERS & SENSORS *(misc. projects)*



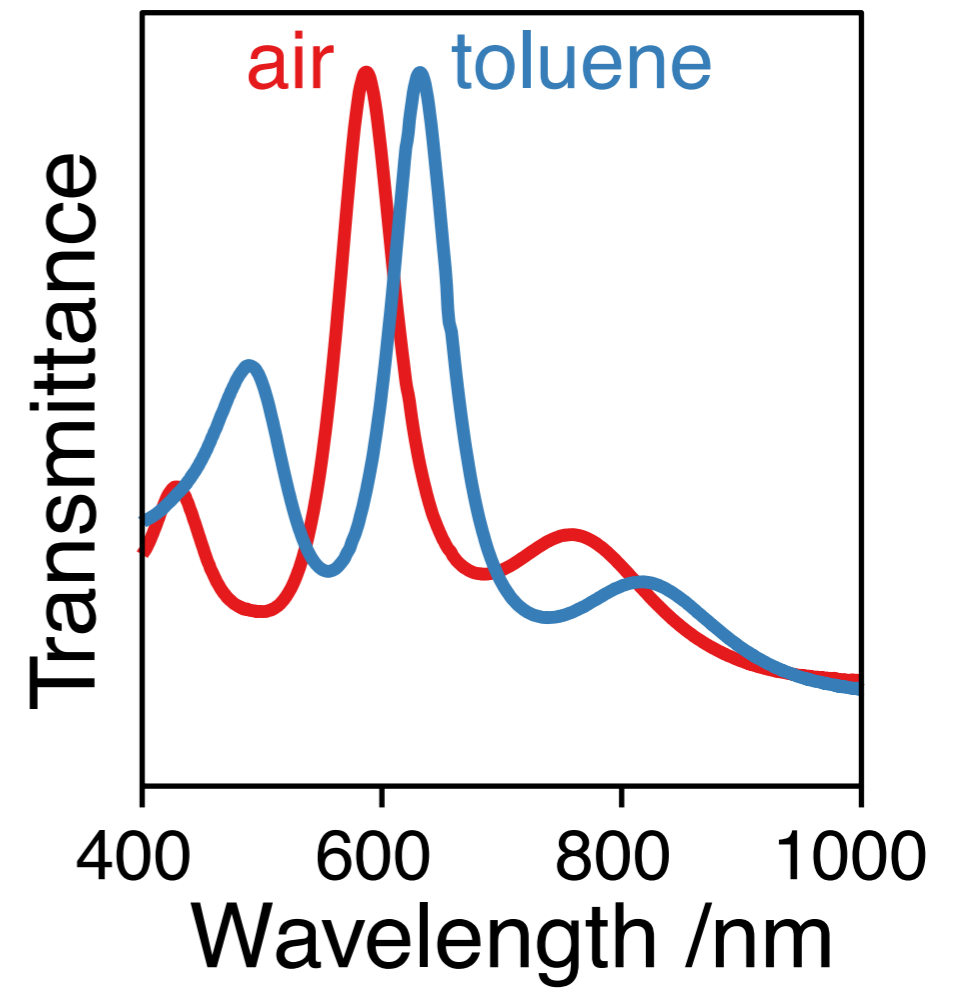
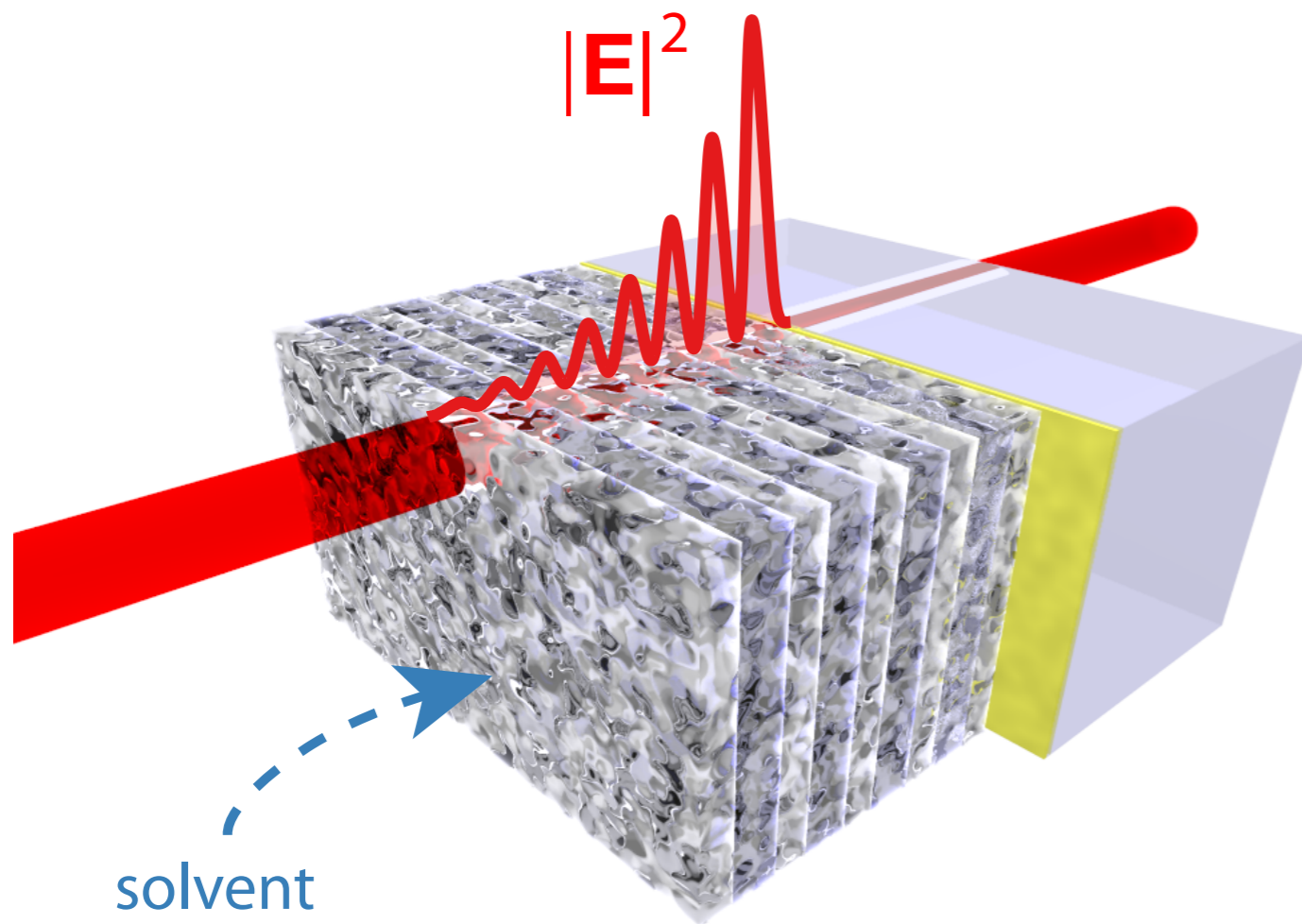


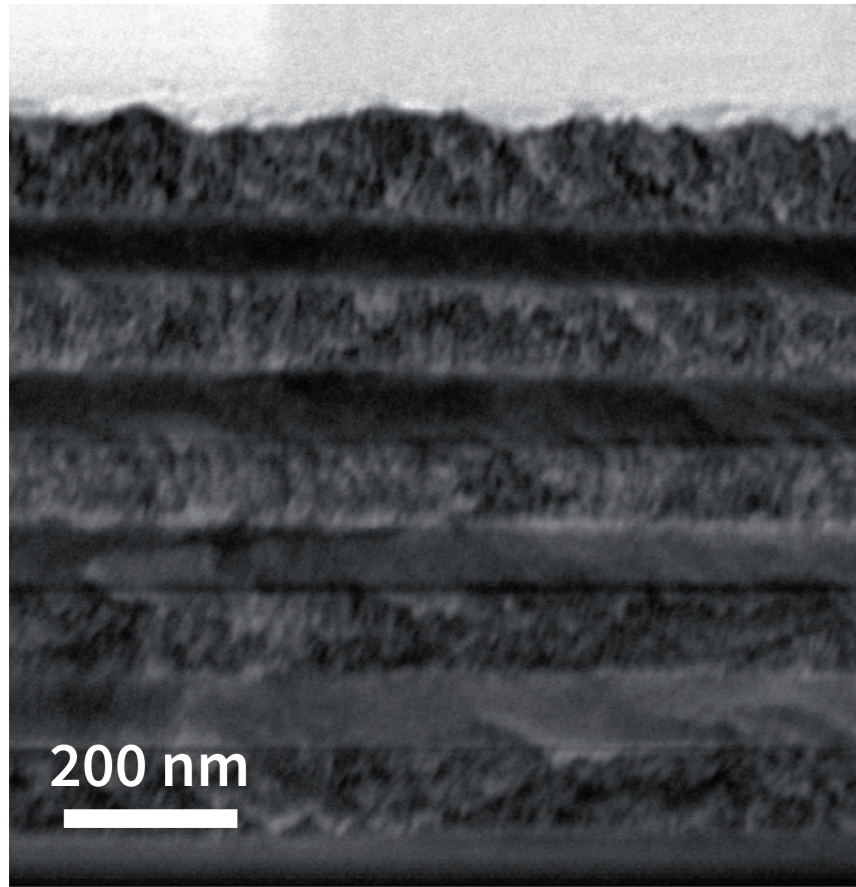
SURFACE PLASMON RESONANCE

SERS & SPR COMBINED

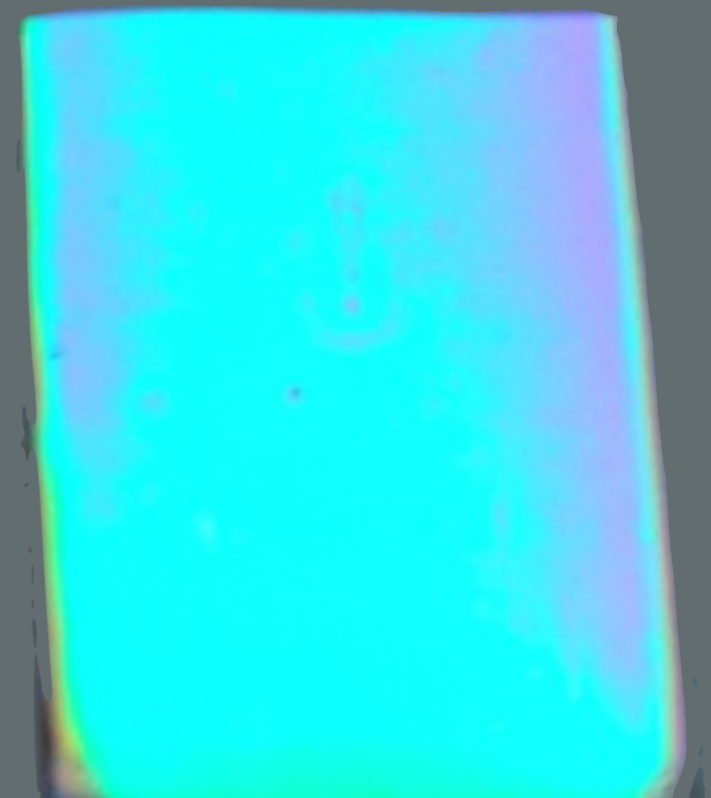
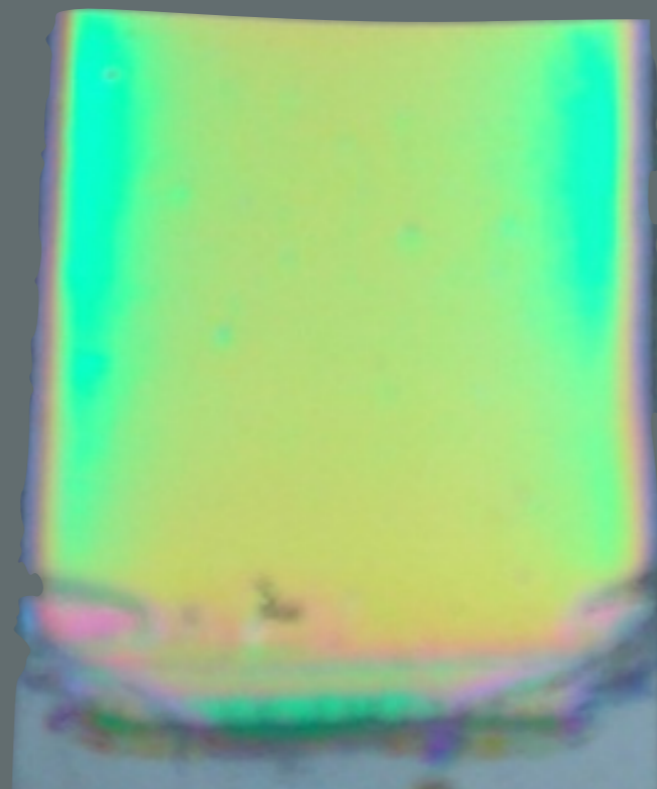
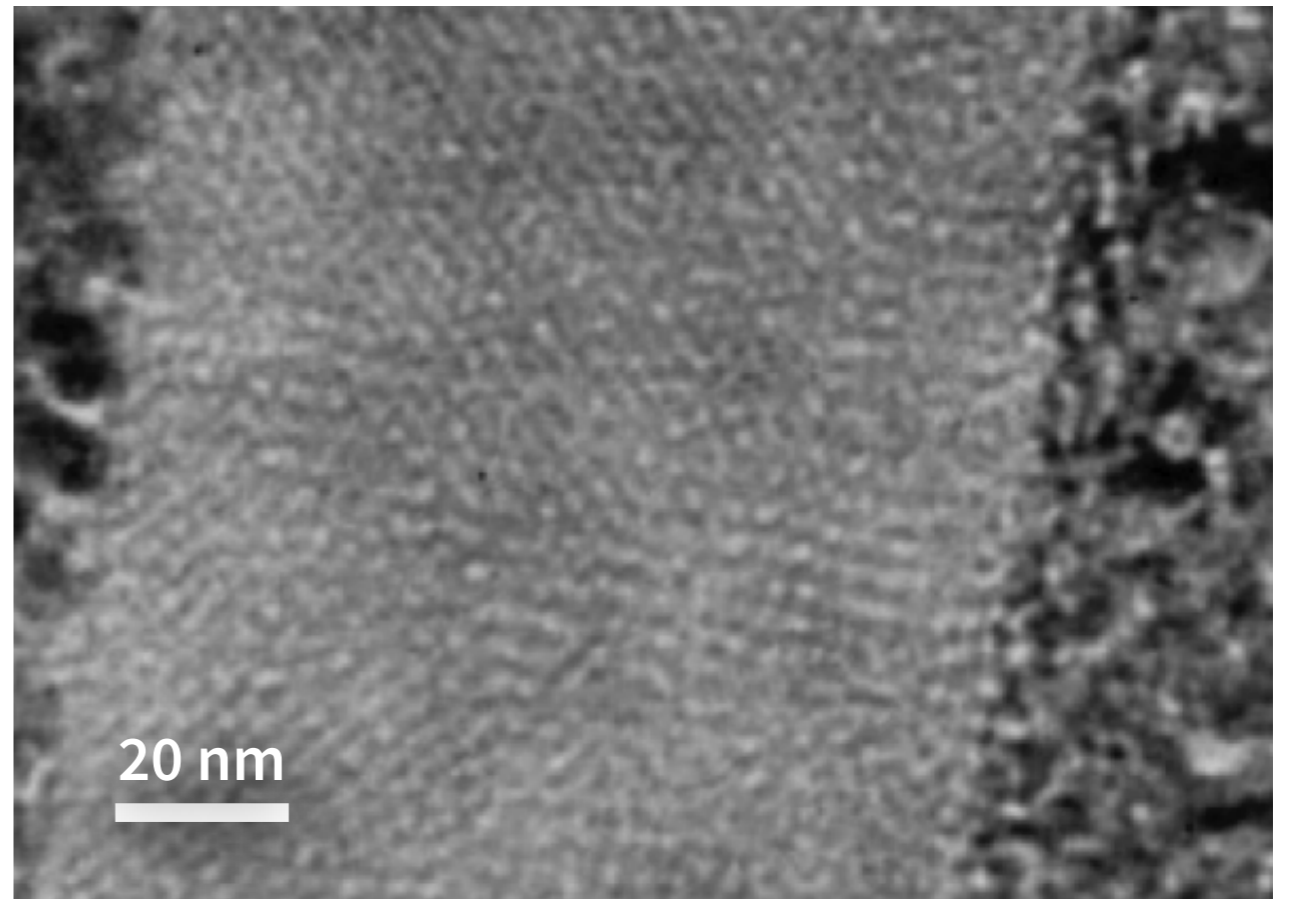


TAMM PLASMONS

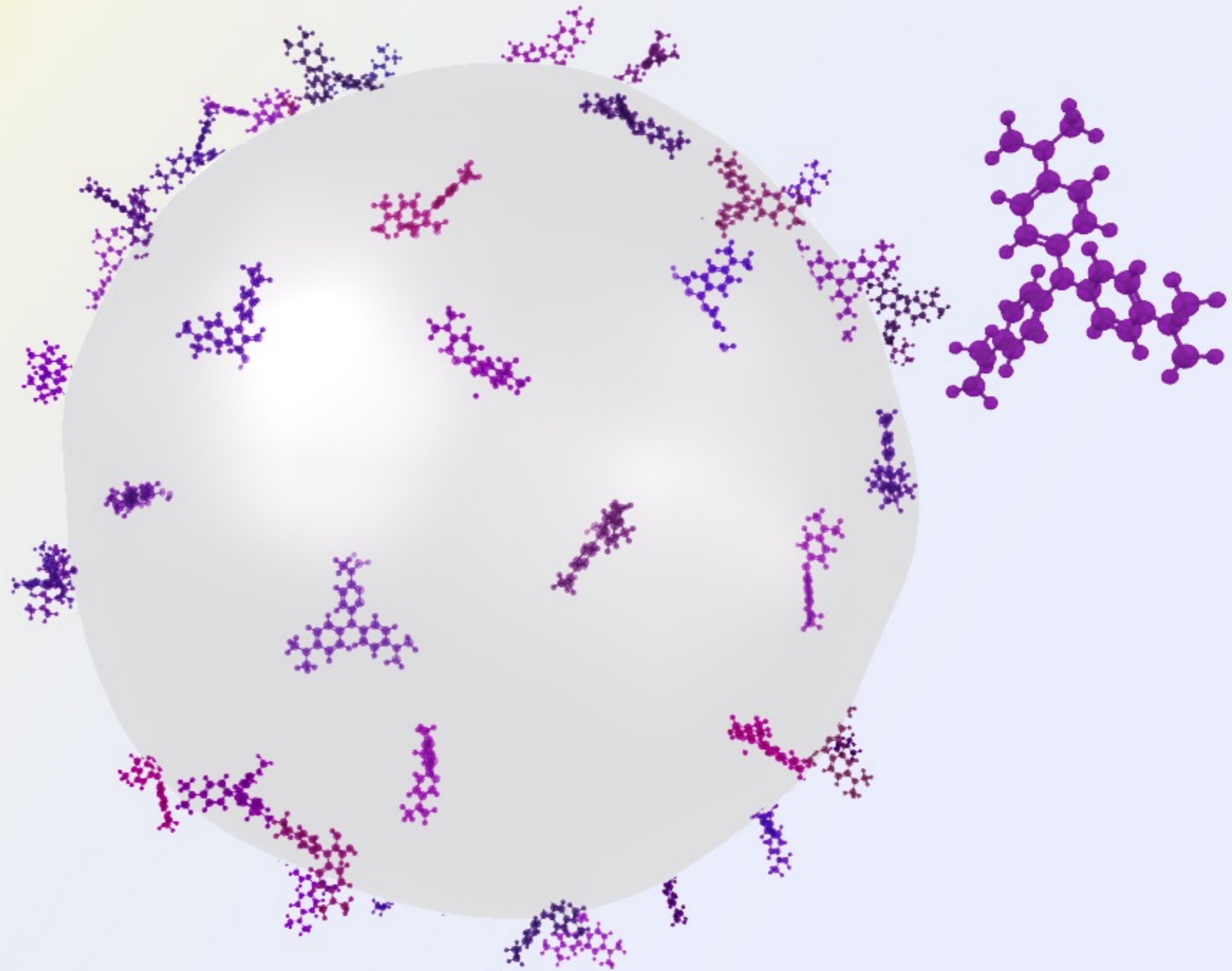




Au 23 nm
TiO₂ 100 nm
SiO₂ 82 nm
TiO₂ 102 nm
SiO₂ 79 nm
TiO₂ 98 nm
SiO₂ 82 nm
TiO₂ 104 nm
SiO₂ 72 nm
TiO₂ 115 nm
glass

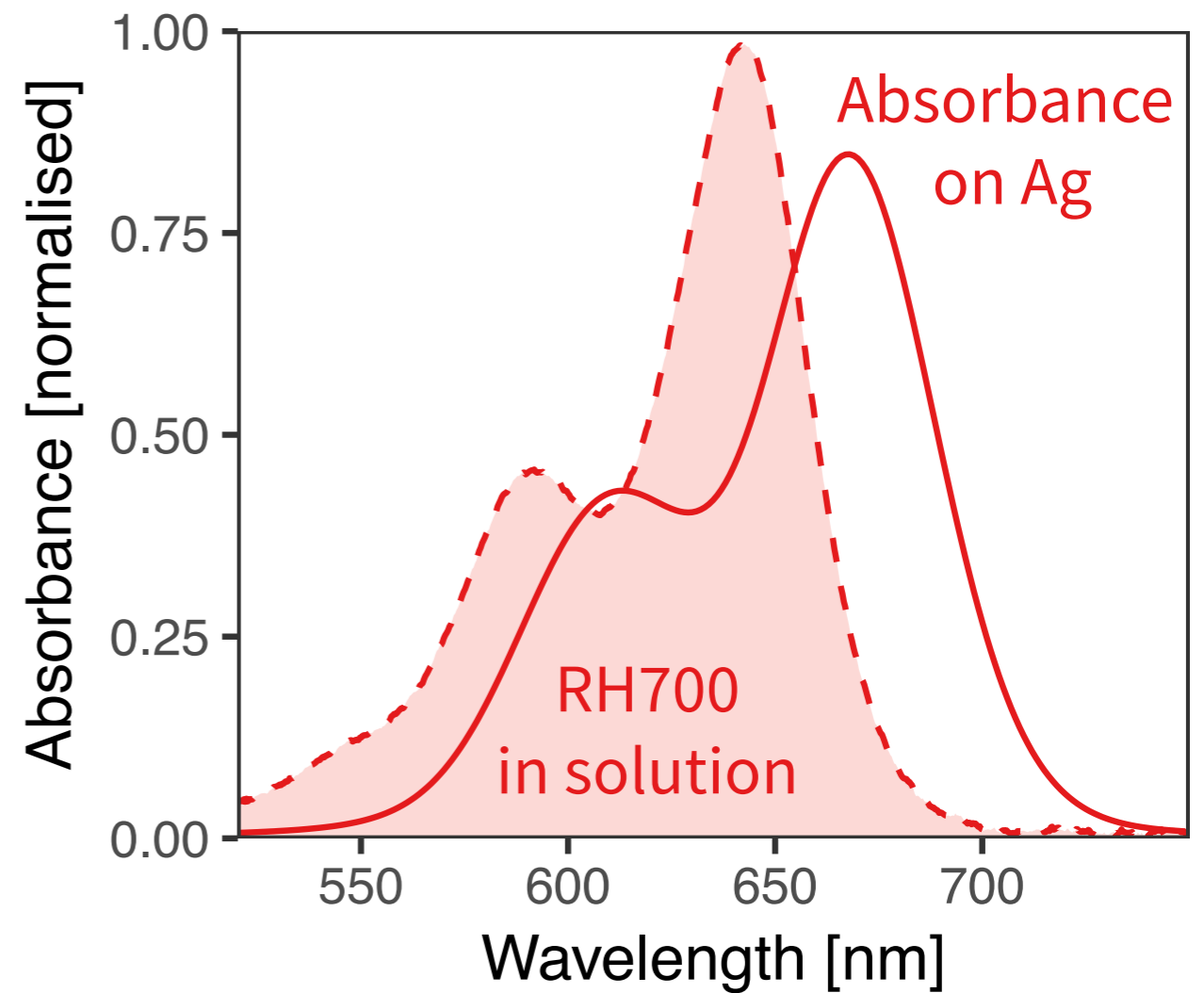
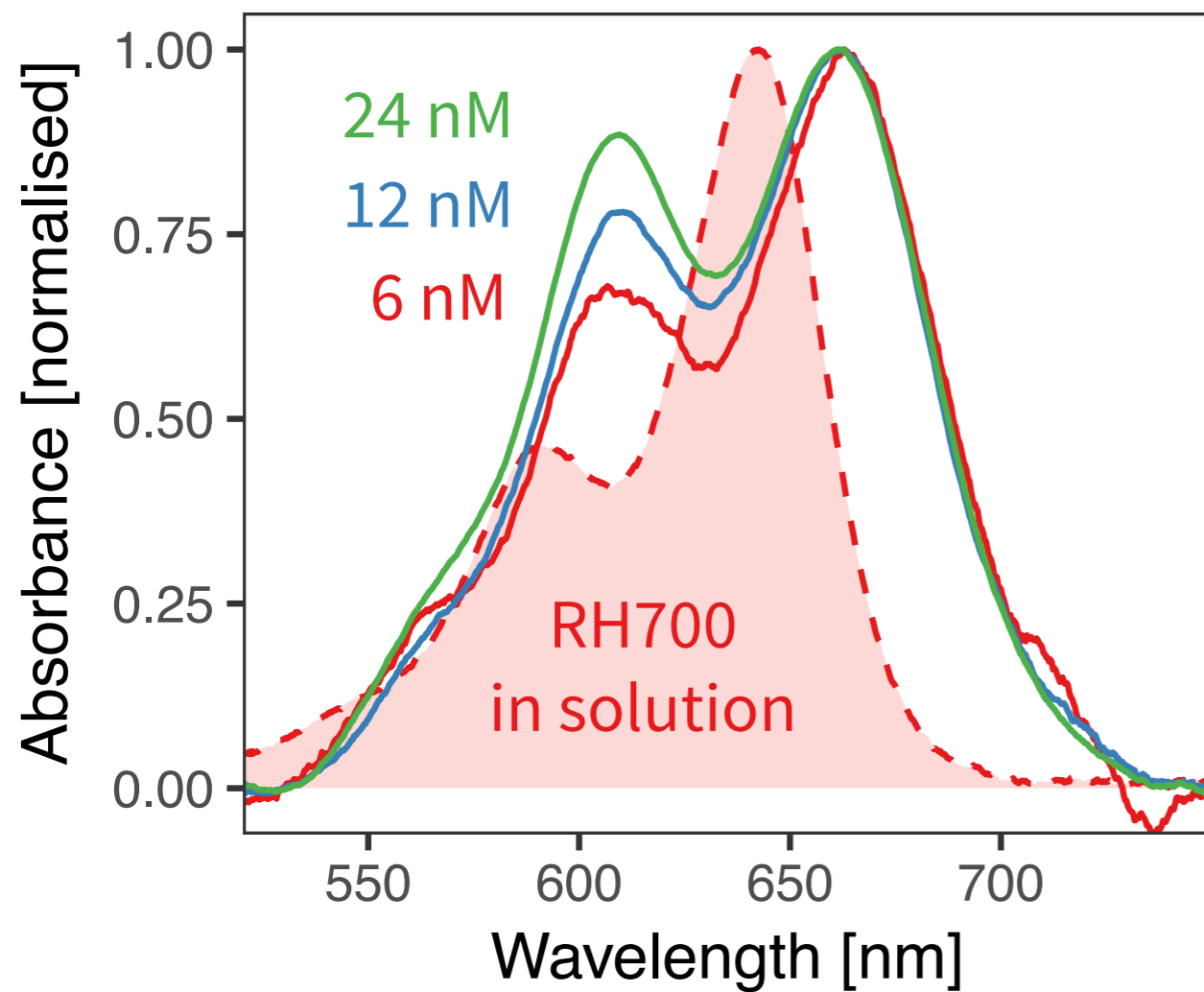


(meet Dr Paula Angelomé at AMN9)

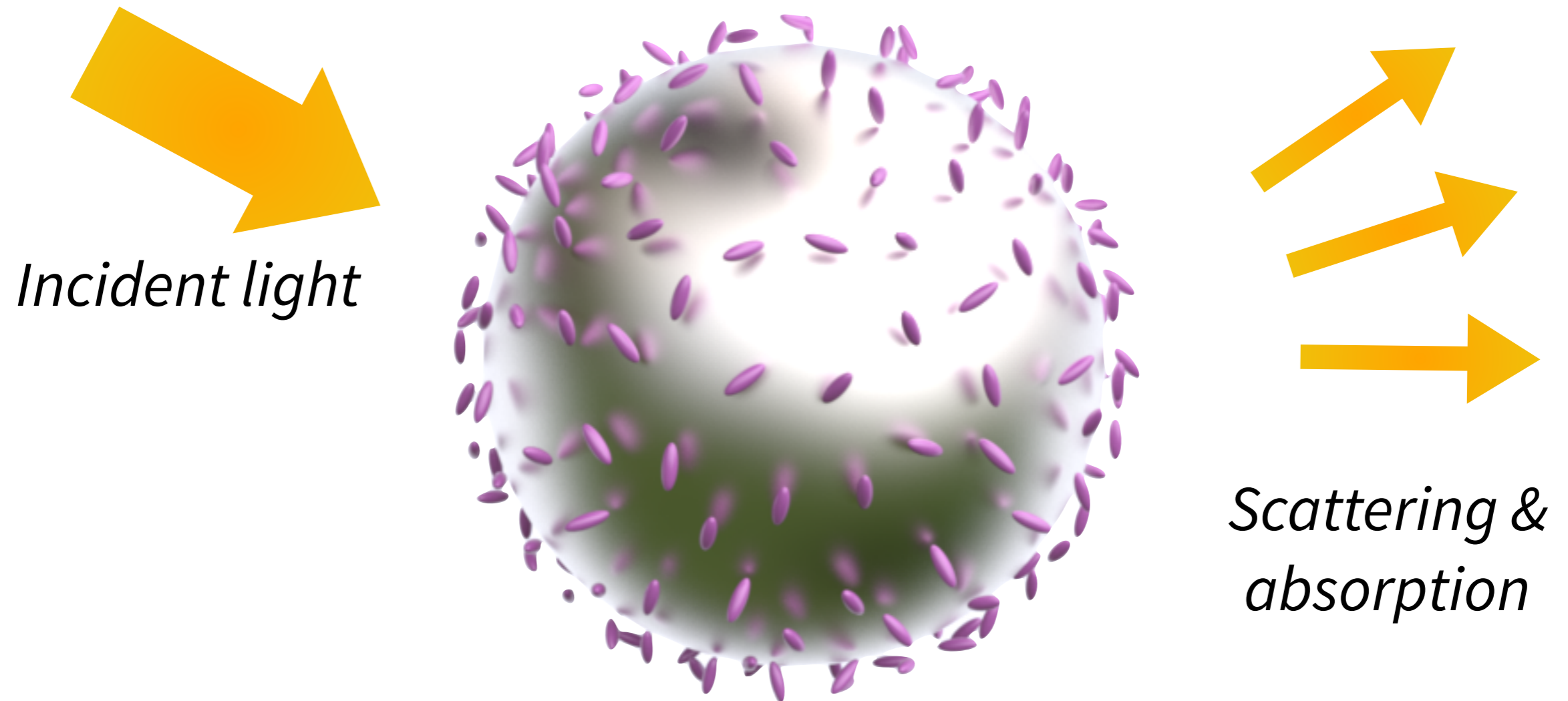


ELECTROMAGNETIC INTERACTIONS BETWEEN MOLECULES
SURROUNDING A METALLIC SPHERE

SPECTRAL CHANGES, CONCENTRATION DEPENDENCE

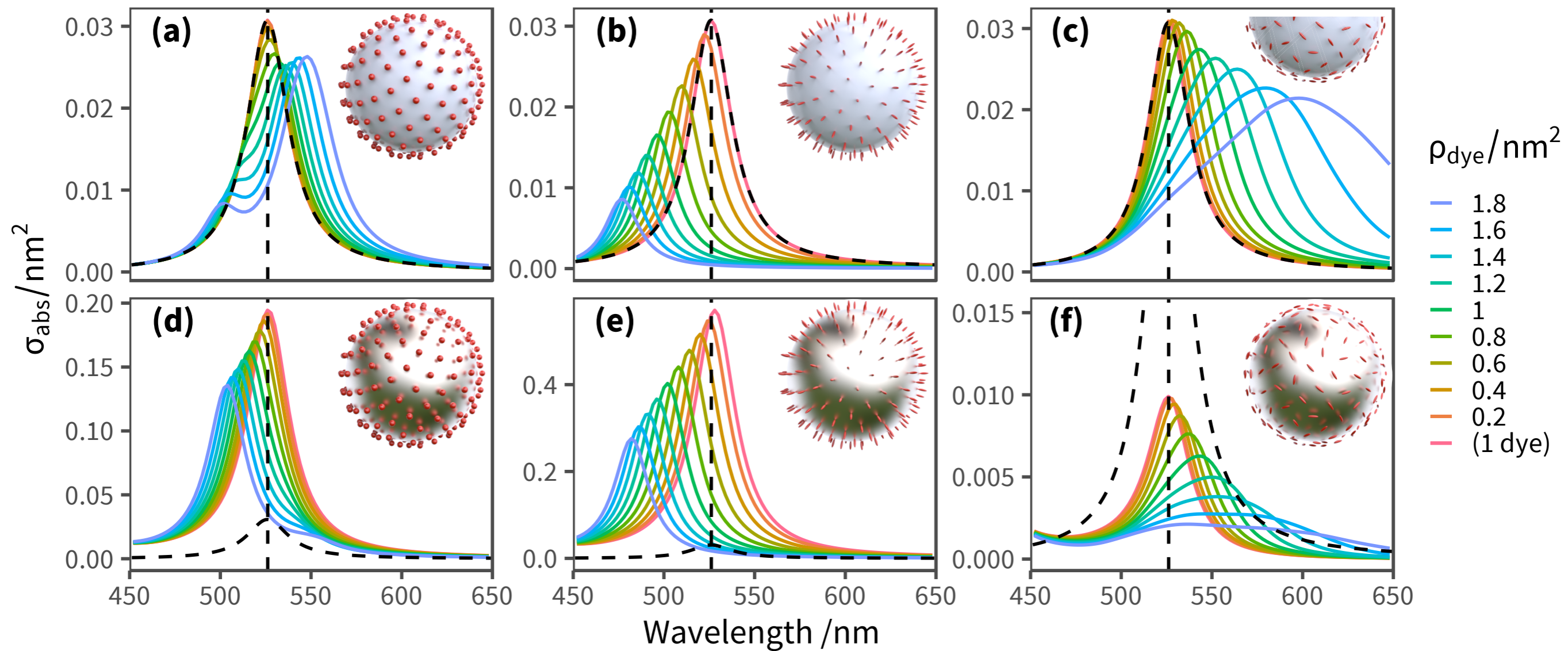


LIGHT SCATTERING PROBLEM



dipole-dipole and dipole-sphere interactions


ELECTROMAGNETIC COUPLING BETWEEN ORIENTED DYES




THANKS:

Atefeh Fazel Najafabadi
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the Raman Lab

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Paula Angelomé

 Luis Liz-Marzán
Javier García de Abajo

 Bill Barnes

RUTHERFORD
DISCOVERY FELLOWSHIPS

ROYAL
SOCIETY
TE APĀRANGI



The MacDiarmid Institute
for Advanced Materials and Nanotechnology



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