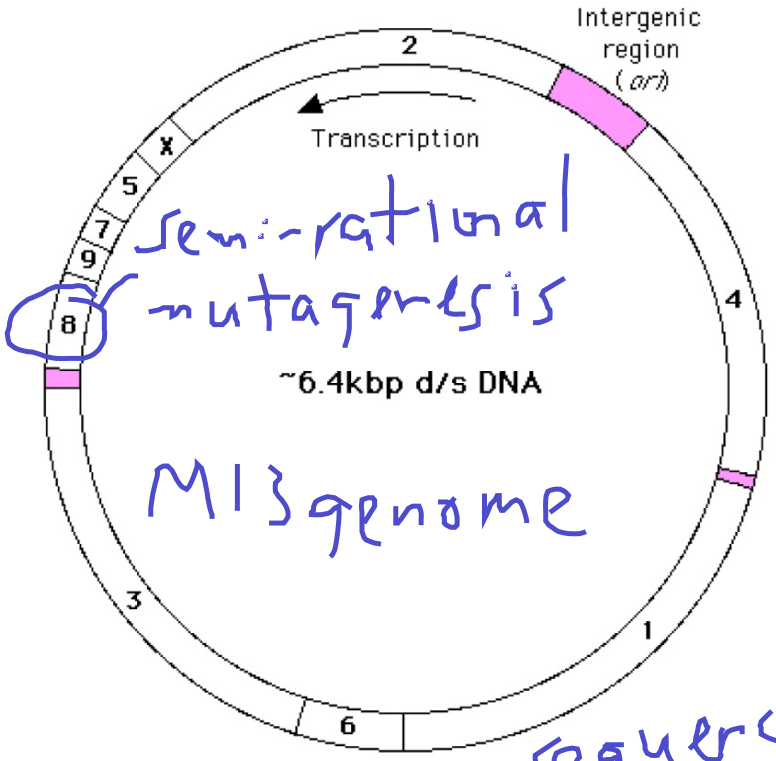
- Announcements
- Lab Quiz
- Pre-lab Lecture
  - ❖ Review M13 engineering
  - ❖ Review solar cell big picture
  - ❖ Intro to TEM
  - ❖ Nanocomposite synthesis/ today in lab (M3D2)

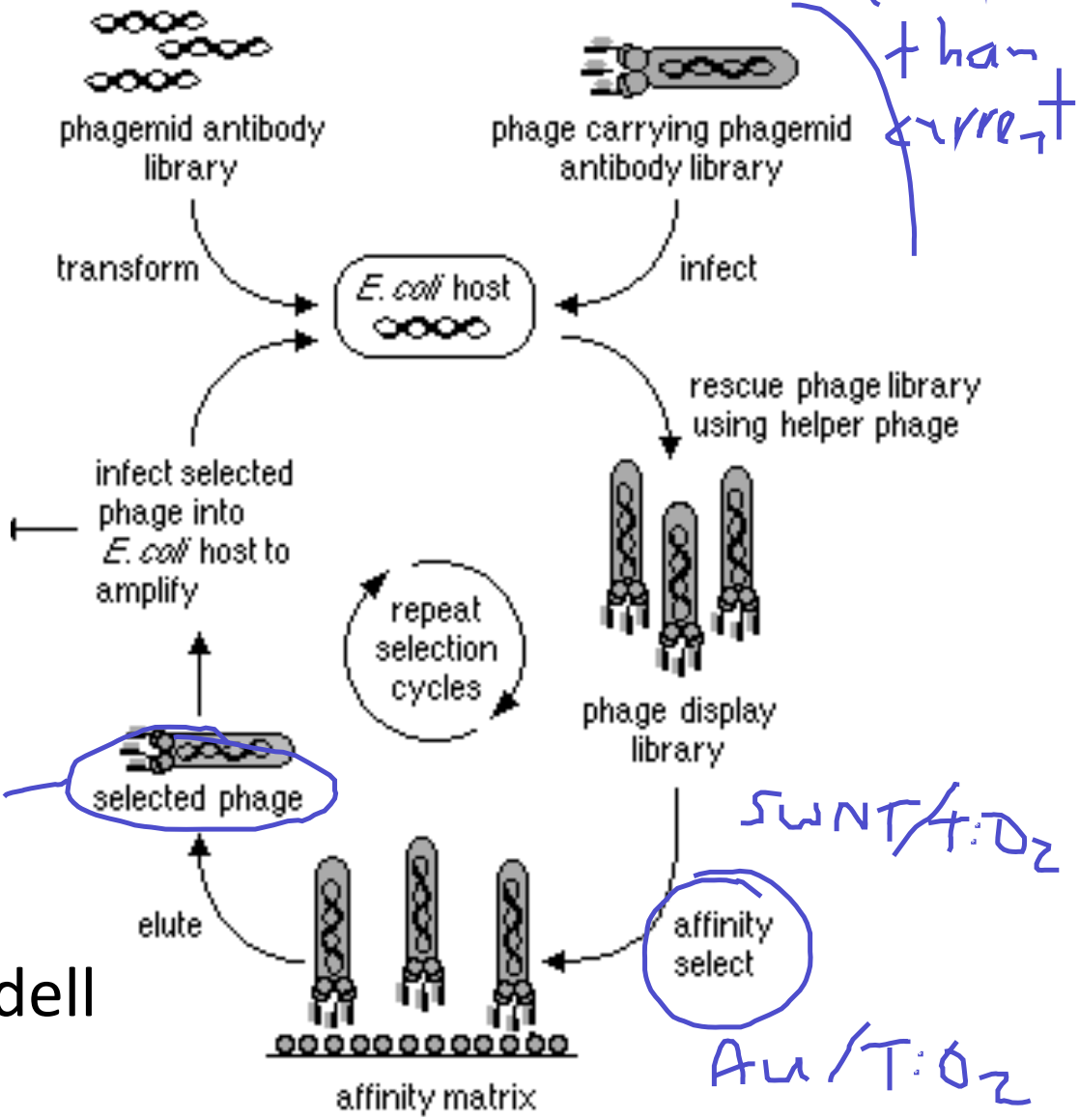
Announcements

- No lab all next week, but we DO have lecture Tue
- Return for TEM → prepare samples today
- Start defining research pre-proposal → due M3D4
- OH on Monday 2-3 pm (16-319)

tutor

Phage don't normally bind SWNTs/Au and TiO2. How did Angie's lab find such phage?





Slide modified from N. Kuldell

Engineering M13: further possibilities

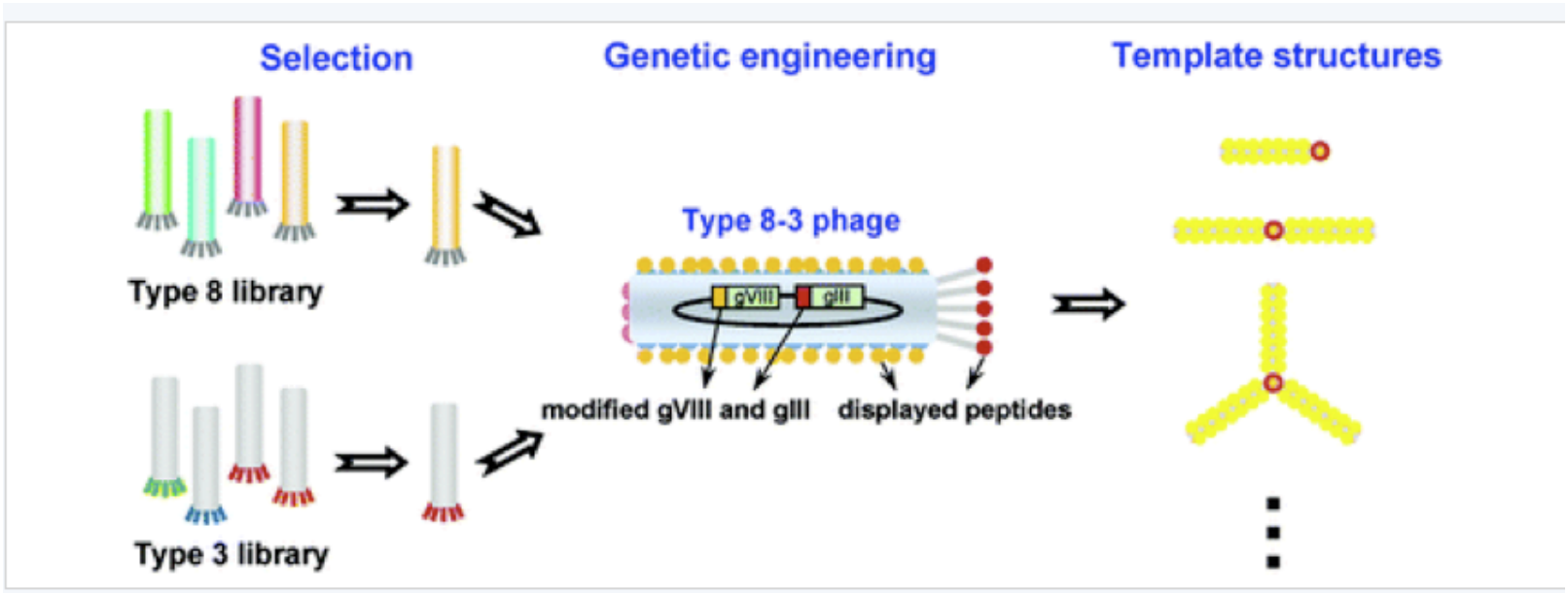
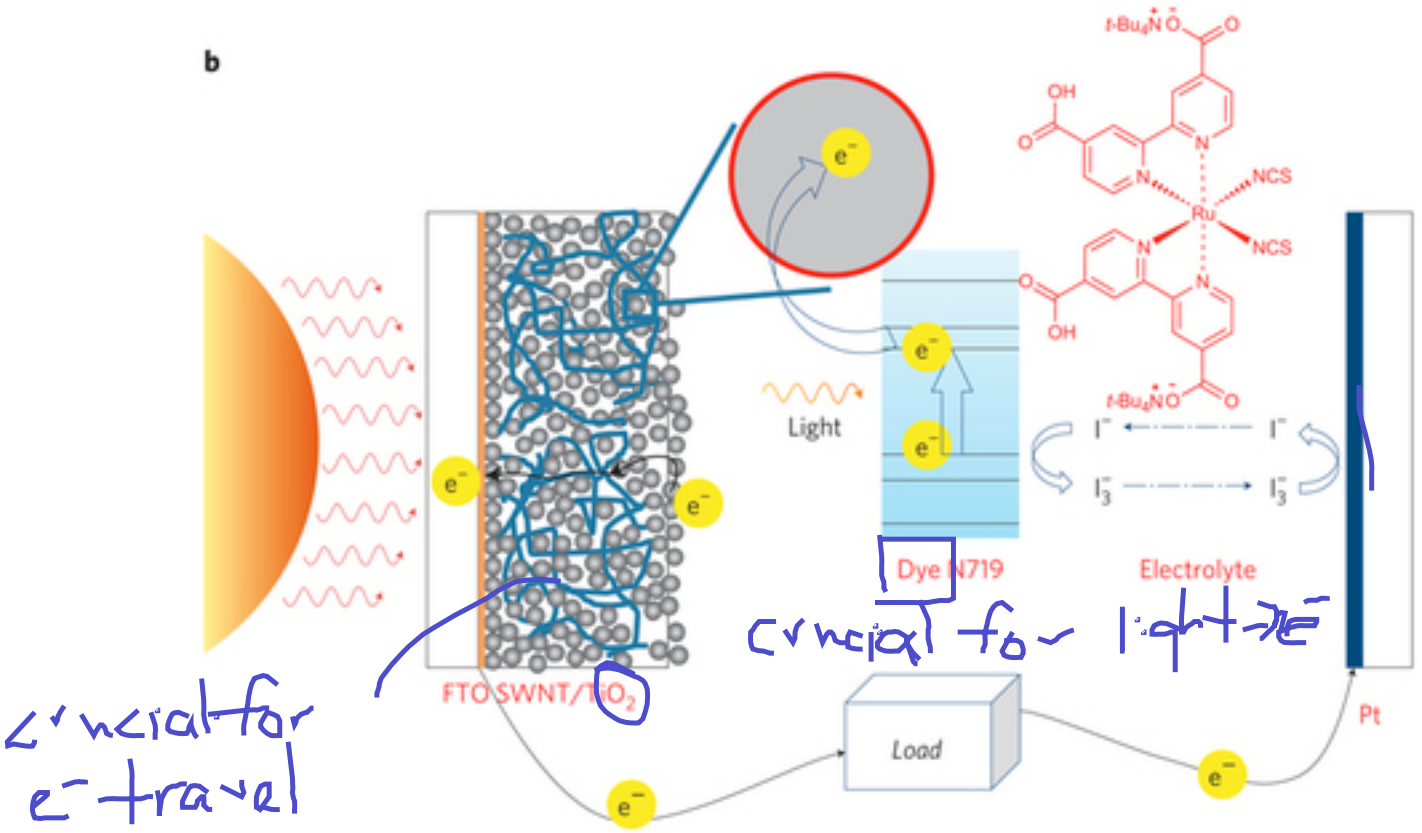


Image from Y. Huang et al., *Nano letters* **5**(7):1429 (2005).

Solar cell review



SWNTs: improve e- paths to detector, collection efficiency

Au: improve *light* collection efficiency, plasmonic effect (broader λ)

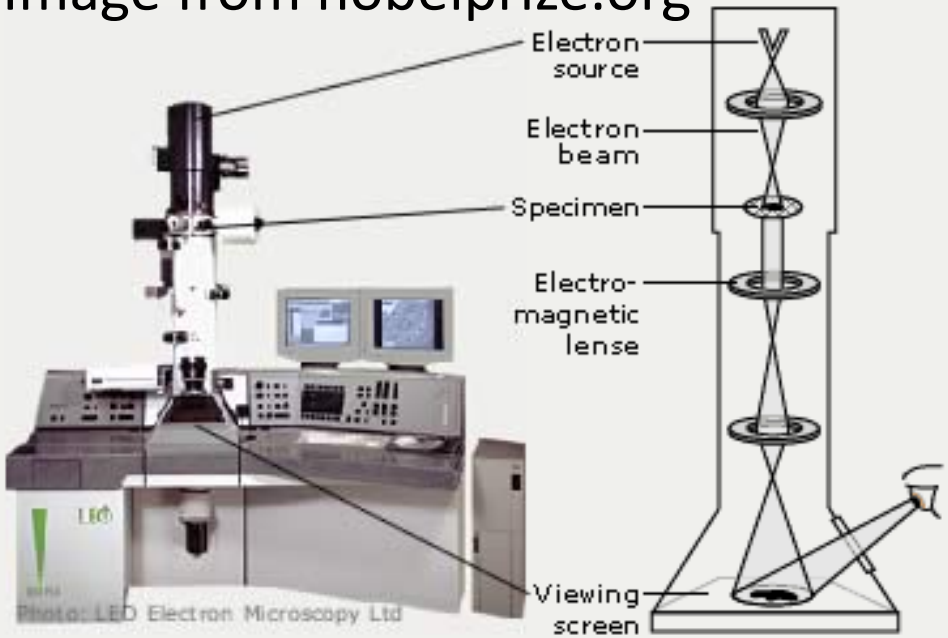
Image from wiki

TEM: foundations

- Very high resolution – why?
  low λ of e^- compared to light
  transmitted, scattered
- EM lens to focus
- Sample preparation
  - very thin, under vacuum
  - can't image *in situ* bio.

  cryo-TEM
- Many imaging modes

Image from nobelprize.org

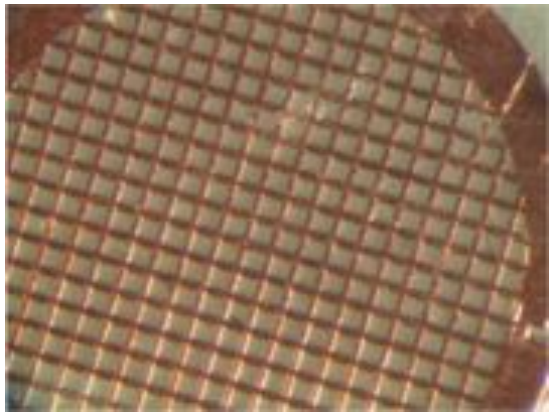


TEM: your experiment

- Morphology, density, *maybe* elemental analysis
- Protocol:
  - Each person should prepare a grid
  - Disperse wires: vortex
  - Load onto Cu/carbon grid
  - Incubate, wash grid

disperse energy

Grid is extremely delicate!



Nanocomposite synthesis: overview

- Goal: compare system made w/varying SWNT/Au:ϕ
- All reacted with same [Ti(I-pro)4]

Calculations!

solvent goal: 95% EtOH - based on Vϕ

solute goal: 15:1 TiO2:ϕ by *mass*

Prepare supercooled EG/EtOH bath (-40 °C)

Pre-chill EtOH solvent (10')

Add Ti(I-pro)4 (stir 5')

Add complexed ϕ mixture (stir 20', 1h⁻ to RT)

Prepare aliquot for TEM

Centrifuge, wash rest of mixture

coats/glasses/gloves

Hazard statement(s)	
H226	Flammable liquid and vapour.
H316	Causes mild skin irritation.
H319	Causes serious eye irritation.
H331	Toxic if inhaled.