

Biomaterials Engineering

M3D2
11.15.12

- Biom mineralization with TiO₂
- Prep for TEM
- Research proposals

Comparing efficiency of solar cells made with different amounts of Au nanoparticles or SWNTs

Flynn, *Acta Materialia* 51, 5867-5880 (2003)

Phage provide binding sites for Au nanoparticles

To optimize light collection: vary ratio of Au:phage

Phage provide architecture for SWNTs

SWNTs have different amounts of metallic and semiconducting materials on them which can short circuit electron paths

To optimize electron collection: vary ratio of SWNTs:phage

- Solvent exposed surface for TiO₂
- Unbundle SWNTs

Image from MIT news

Reactions with titanium isopropoxide

1. For some: retrieve phage:SWNTs from dialysis bags, chill
2. Calculate volume of 100% EtOH to make 95% with phage soln
3. Cool EtOH in flask with 1:1 ethylene glycol:EtOH:dry ice bath (-40°f)
4. Add 15 parts Ti(i-pro)₄ : 1 part phage 100 ul SWNTs, >5'
5. +phage:material mix, 20' then warm to room temp one hour

TEM

rock

200 keV

wavelength of accelerated electrons (6 pm)

Mount Everest

x 100,000=

wavelength of light (600 nm)

TEM grid + harvest

1. Vortex your samples
2. Retrieve grid with tweezers
 - hold EDGE of grid!
 - look for # under microscope
3. Place 5ul of nanocomposite onto grid
4. 5' then wick away any moisture
5. Wash with 100% EtOH (30" + wick)
6. Wash with H₂O (30" + wick)
7. Harvest remaining materials 3K, 10'
 - supernatant to chem waste
 - wash with H₂O
 - Spin and decant sup to waste

DONE! (no lab next week but see you in lecture Tuesday!)