

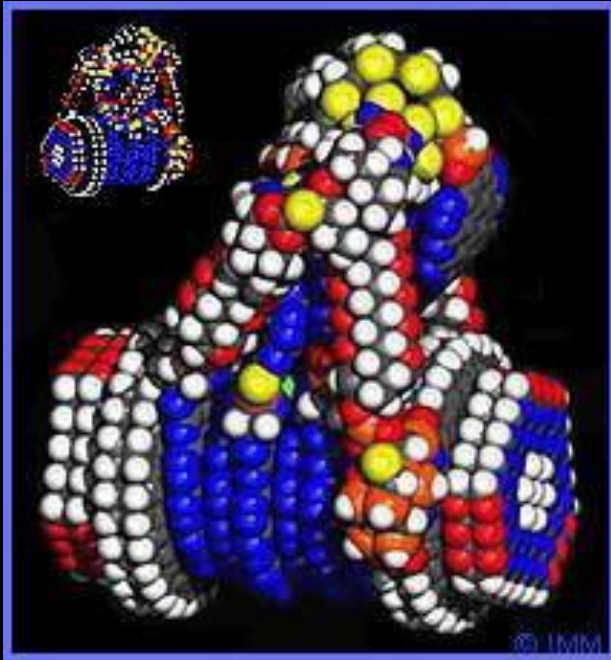
Building the Nanomachines

Enze Chen

Awesome videos

- DNA replication
- Protein synthesis
- ATP synthesis

Nanomachines



Nanotechnology

- 1,000,000,000 nanometers = 1 m
- "There's Plenty of Room at the Bottom" (1959)
- *Engines of Creation* - Drexler (1986)
- "Why the future doesn't need us" (2000)
- *Prey* - Crichton (2002)

- Based on your knowledge of biology, why might nanotechnology be appealing?
(*Hint: cell division*)
 - Surface Area to Volume ratio!



1 cm

$$\text{SA} = 6 \text{ cm}^2$$

$$\text{Vol} = 1 \text{ cm}^3$$

$$\text{SA:Vol} = 6:1$$



2 cm

$$\text{SA} = 24 \text{ cm}^2$$

$$\text{Vol} = 8 \text{ cm}^3$$

$$\text{SA:Vol} = 3:1$$



3 cm

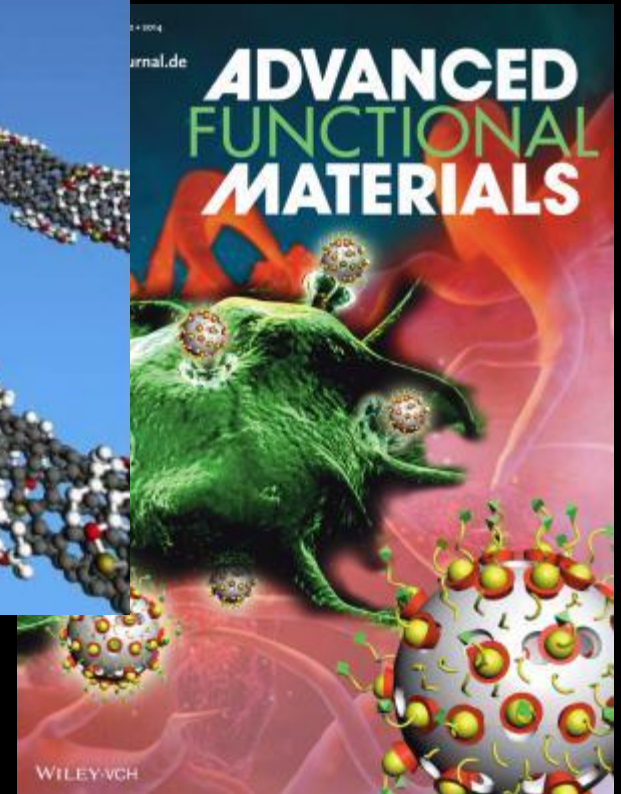
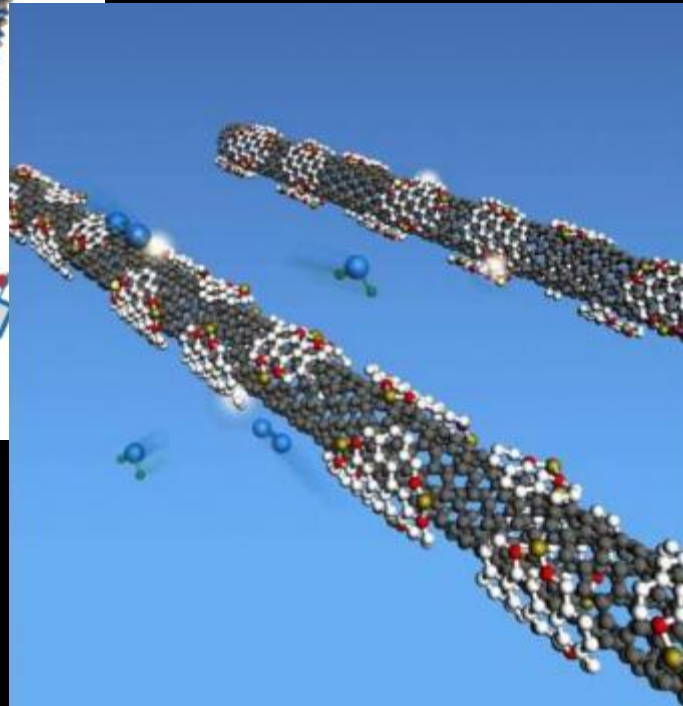
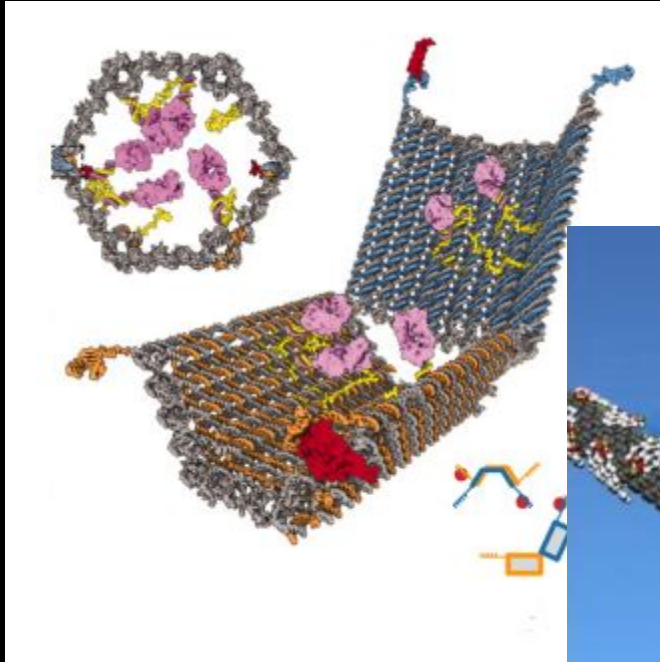
$$\text{SA} = 54 \text{ cm}^2$$

$$\text{Vol} = 27 \text{ cm}^3$$

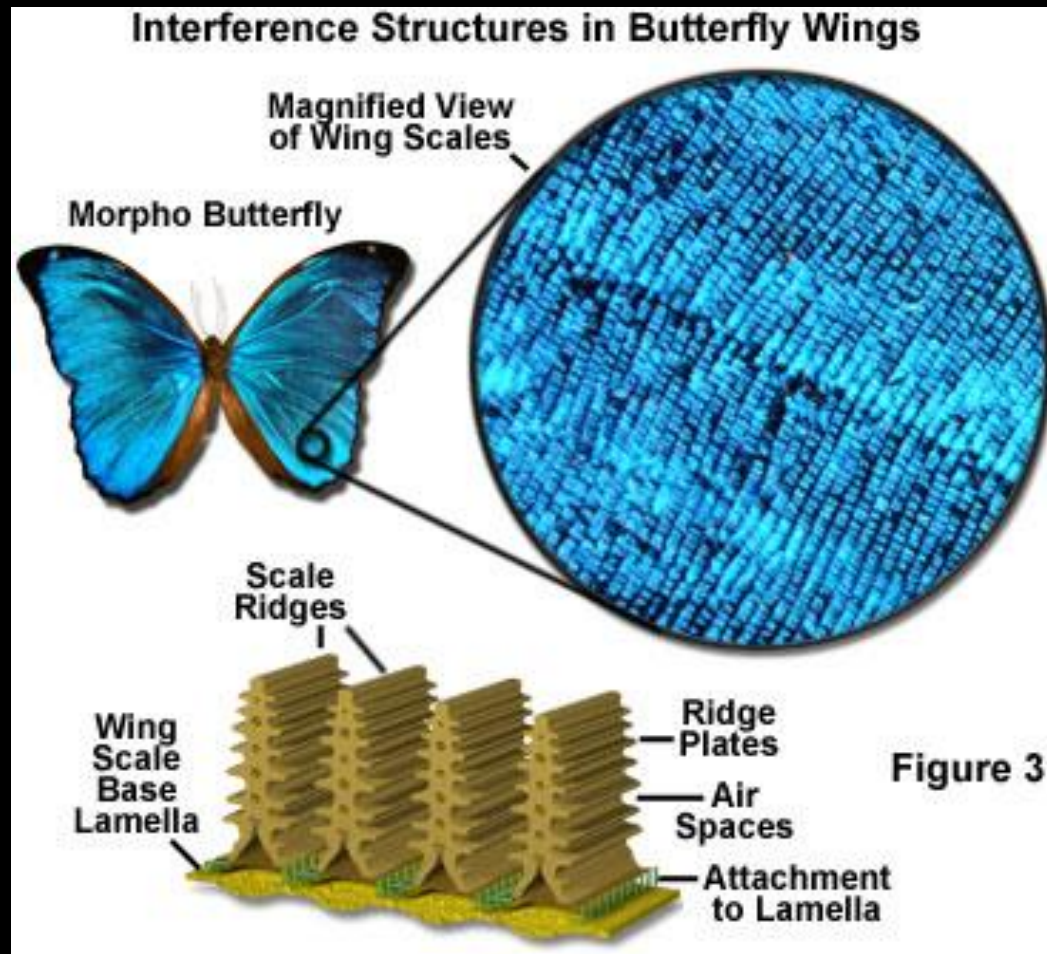
$$\text{SA:Vol} = 2:1$$

- Scanning tunneling microscope
- MEMS - Microelectromechanical systems
 - Vapor deposition, lithography, etching
- Self-assembly
 - Gold nanoparticles
 - Nanovesicles into trees

Nanomachines!



More nanomachines!

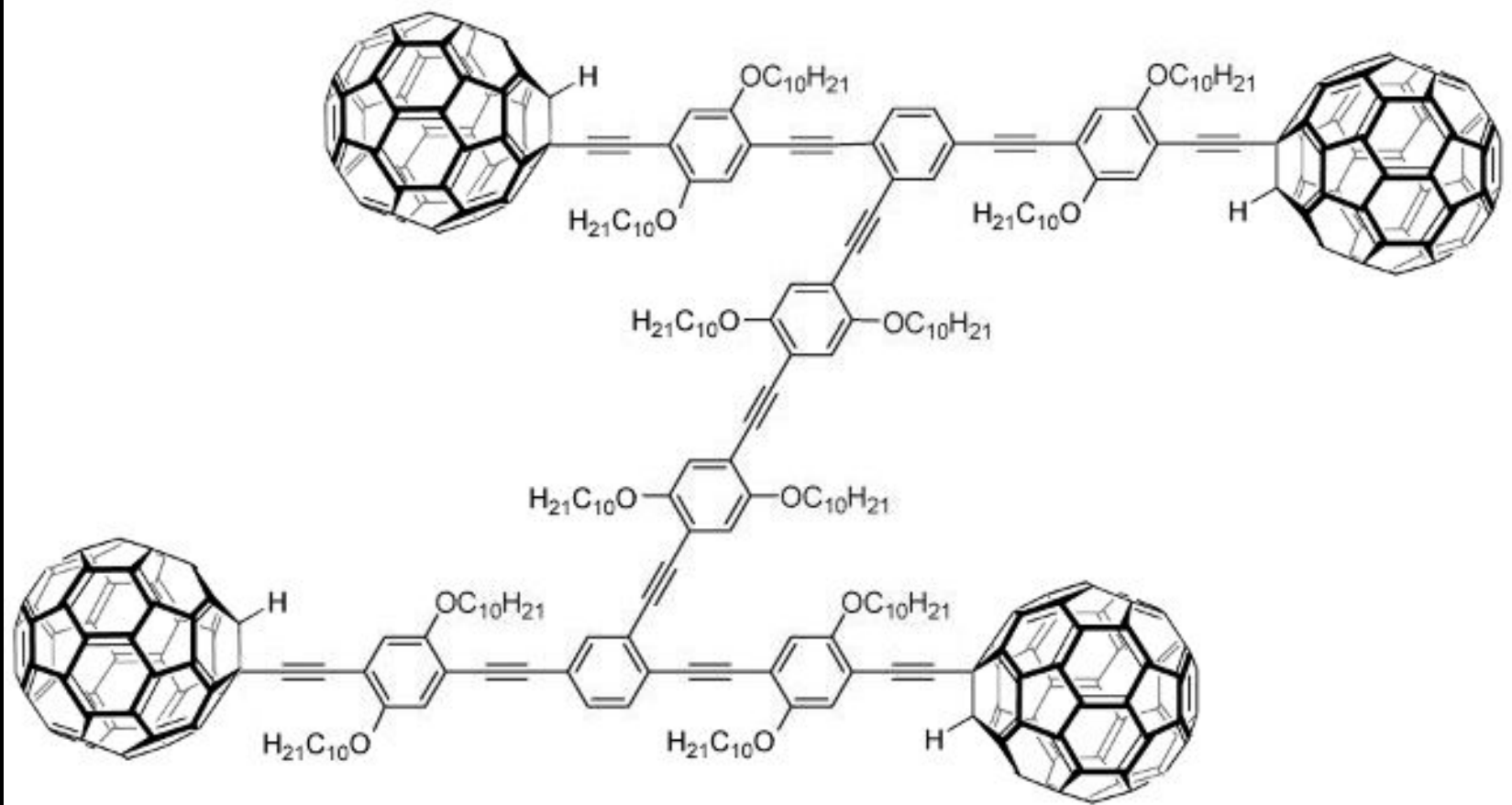


Gecko
toes

Considerations

- Form Fits Function
- Integrity
- Biocompatibility

Nanocar



Questions?

