

Nanostructured Biomaterials Lab

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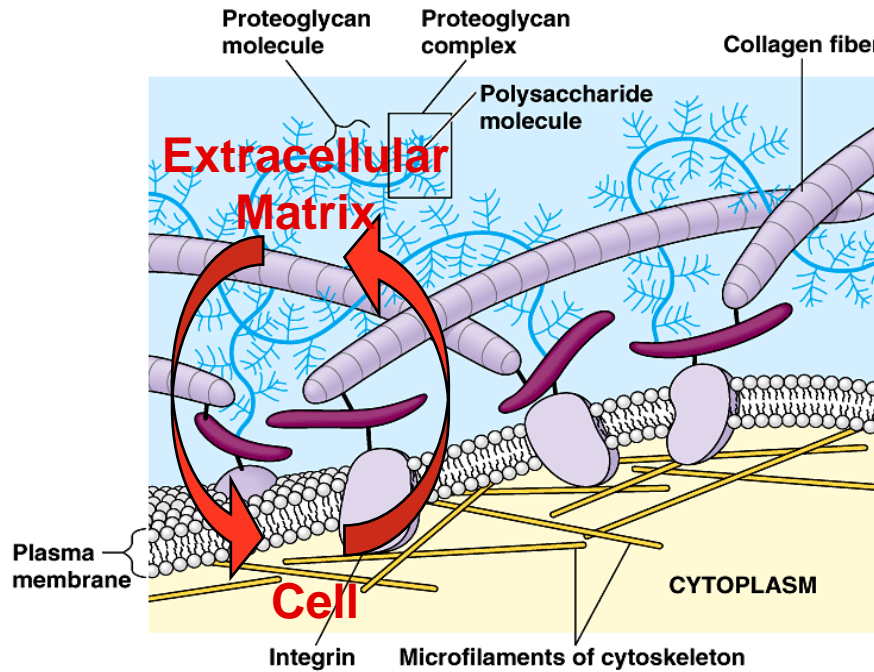
Molecular Biology
Protein Engineering
Chemistry
Materials Characterization

**Self-Assembly of
Biological
Macromolecules**

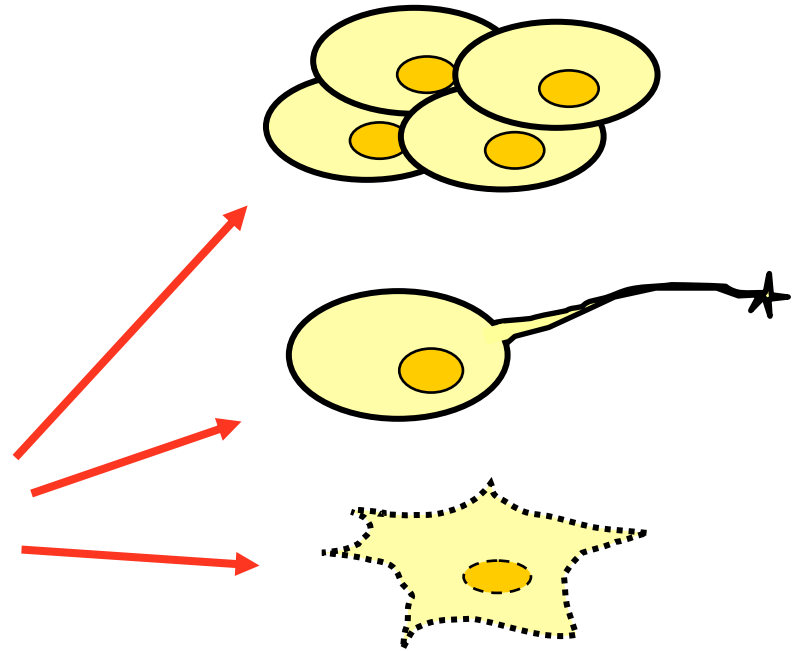


Biomaterials
Drug Delivery
Nanotechnology

Fabrication of collagen-like polymers to guide cellular behavior

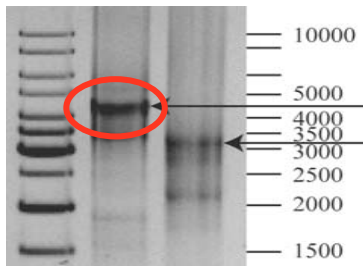


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- Tissue Engineering & regenerative medicine
- Drug delivery

Fabrication of collagen-like polymers to guide cellular behavior



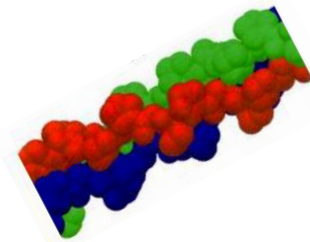
Synthetic DNA: collagen gene
- First *de novo* collagen gene (!)
- Modular design (for introducing non-native signals)



Yeast expression system



Human collagen produced in yeast cells

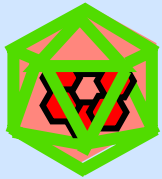
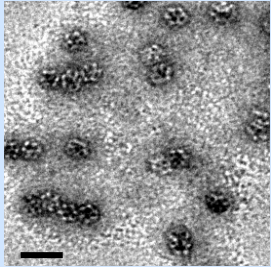


Custom-designed collagen-like polymers

In collaboration with Prof. Nancy Da Silva & CODA Genomics

Genetically-engineered nanocapsules for targeted drug delivery

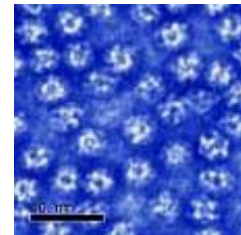
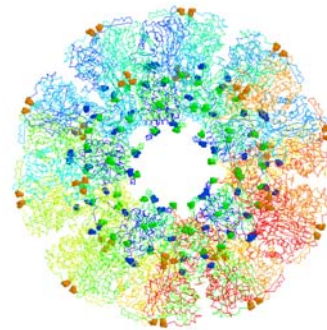
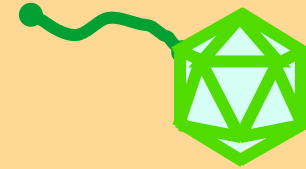
- molecular (drug) encapsulation



Internal

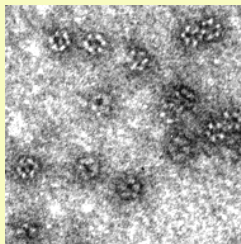
External

- cancer cell targeting

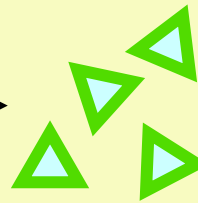
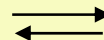


Subunit-subunit interfaces

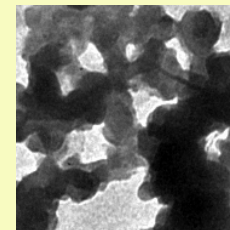
- assembly control
- stability



pH 7.4

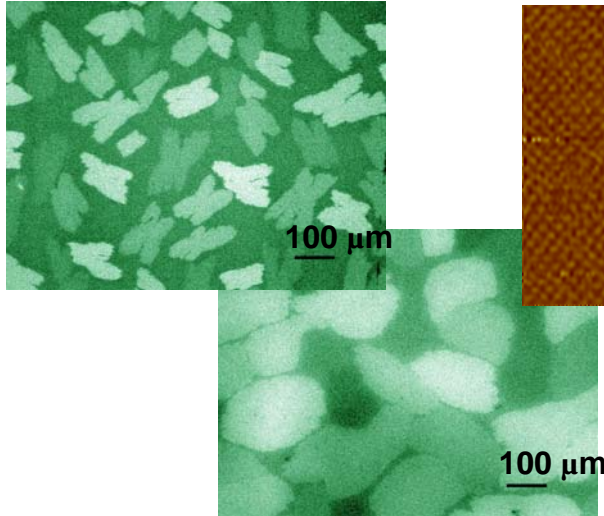


pH 5

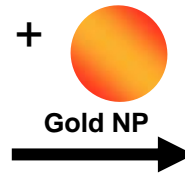
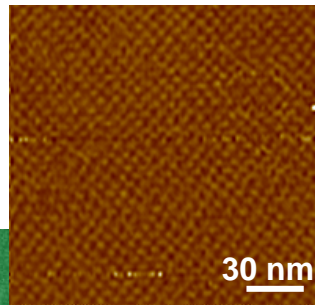


Biological molecules as templates for directing architecture of inorganic nanomaterials

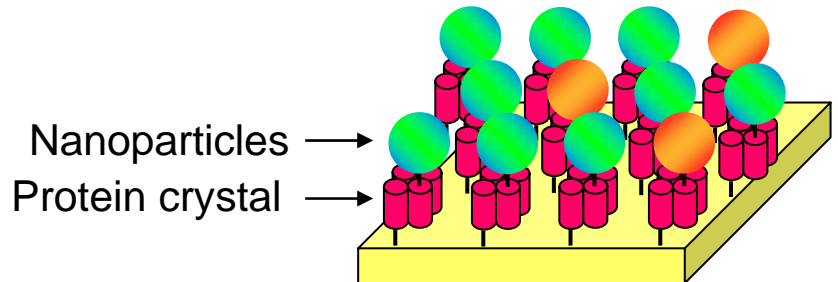
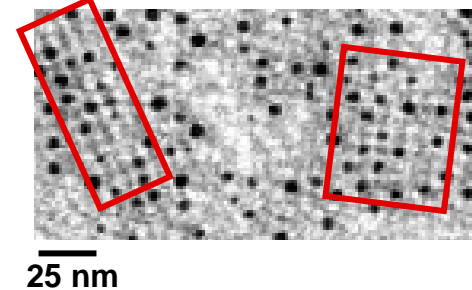
Fluorescence microscopy



AFM



TEM



Properties: Optical
Electronic
Magnetic
Catalytic

*In collaboration with
Prof. Daniel Mumm*