IBDR | INSTITUTE FOR BIOMATERIALS, DRUG DELIVERY & REGENERATIVE MEDICINE

Research Opportunities in the Laboratory for Biomaterials, Drug Delivery and Bionanotechnology

Institute for Biomaterials, Drug Delivery, and Regenerative Medicine

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The University of Texas at Austin

2022 Engineering Graduate Student Orientation

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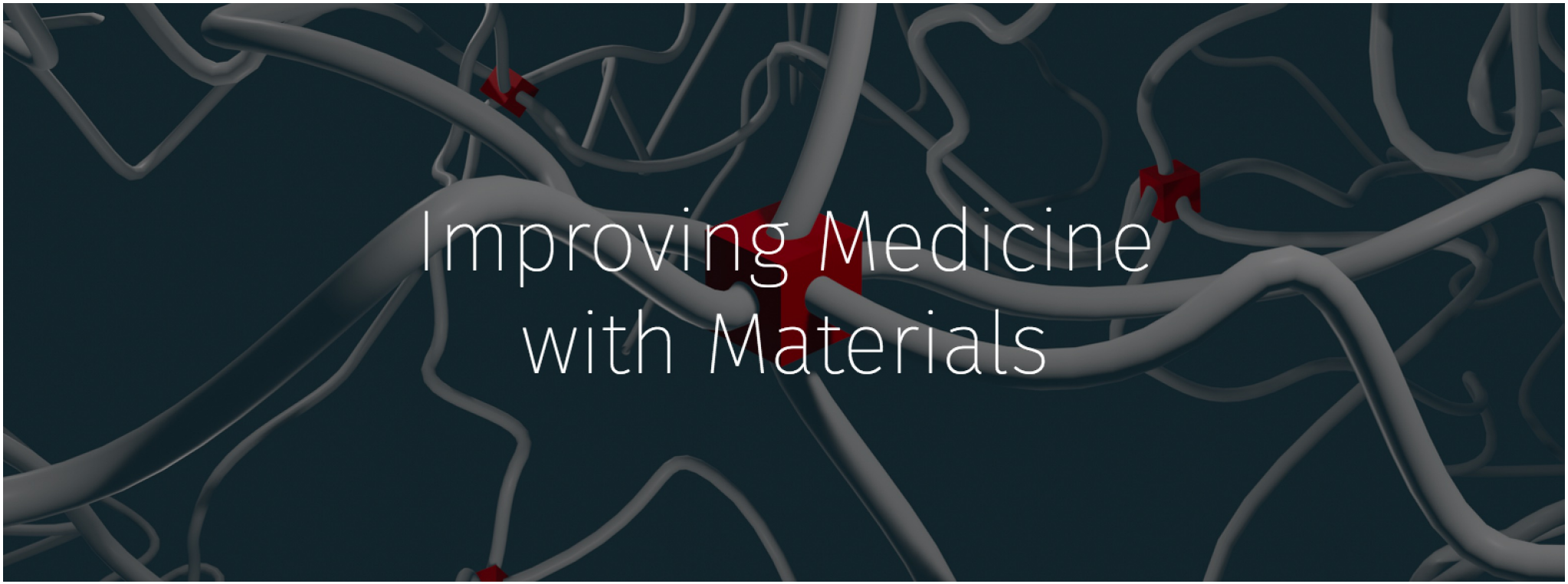


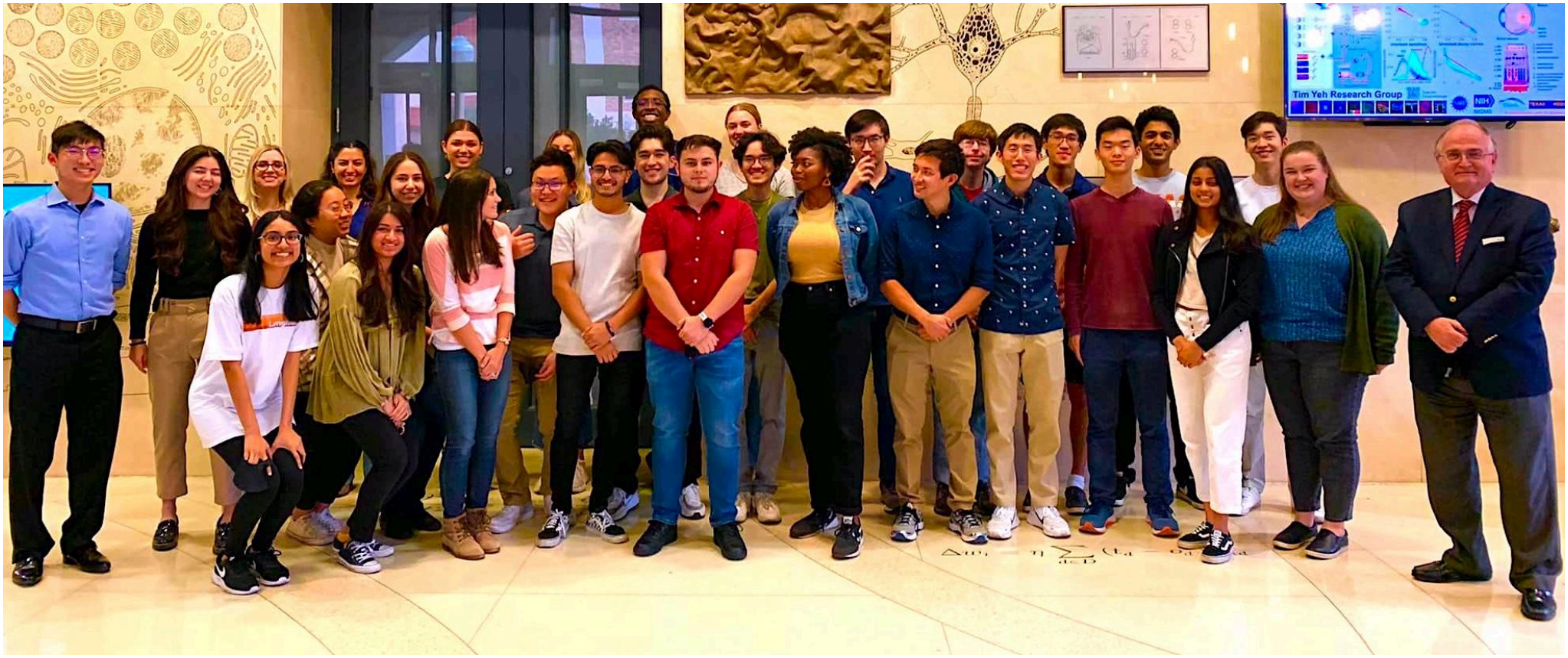
New Website

https://www.peppamers.bme.utexas.edu/

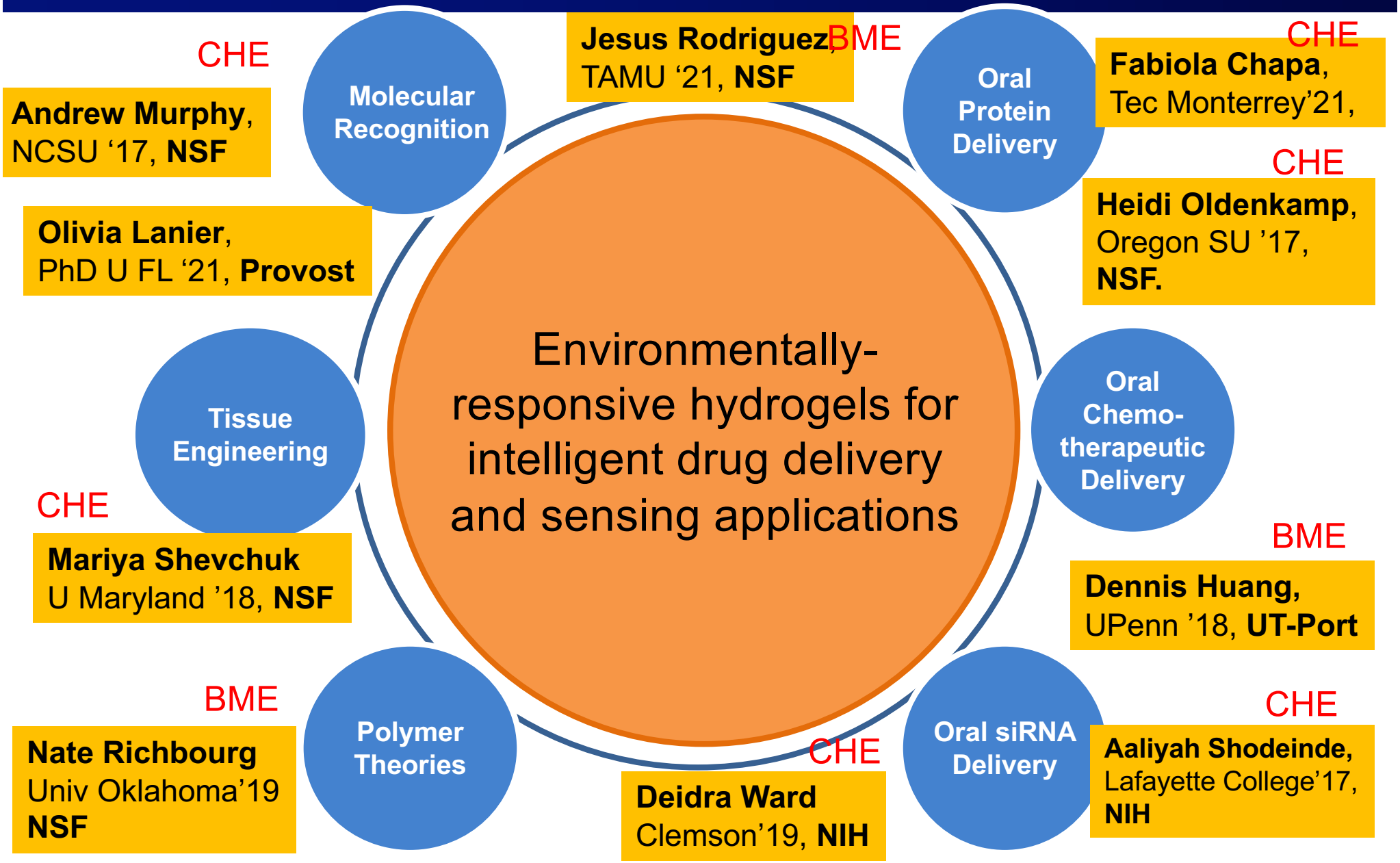
The University of Texas at Austin

2022 Chemical Engineering Graduate Student Recruiting

Overview of Peppas Laboratory Research

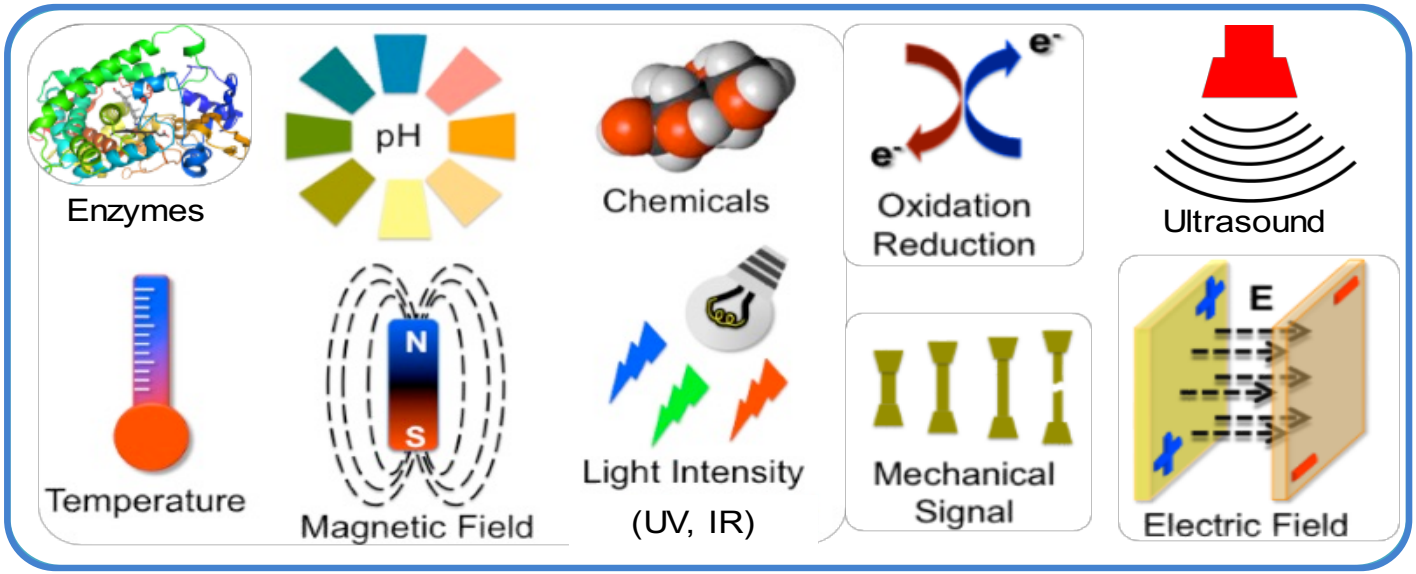


Overview of Peppas Laboratory Research



Overview of Peppas Laboratory Research

To use environmentally-responsive hydrogels
for a variety of drug delivery and sensing applications



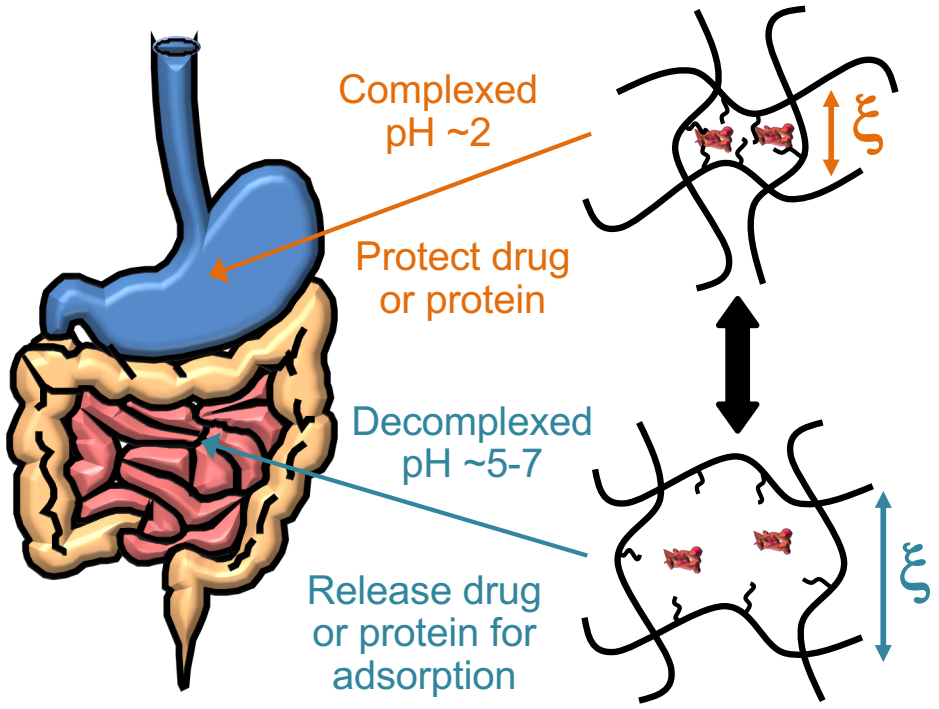
Benefits

- Target site specificity
- Reduced off-target side effects
- Protection of sensitive therapeutics

Challenges

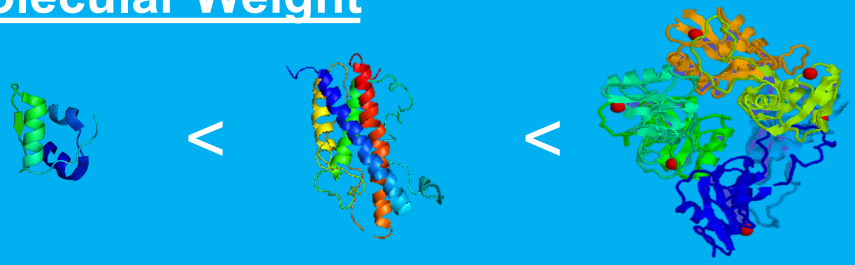
- Disease model
- Choice of stimuli
- Material design

Oral Protein Delivery



Development of a pH-responsive system for the oral delivery of proteins to replace daily injections

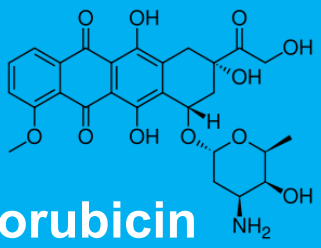
Molecular Weight



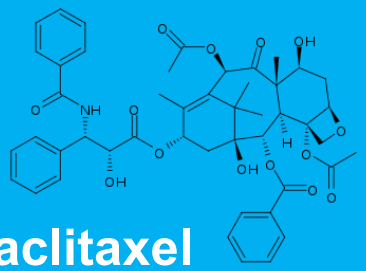
Insulin 5.8 kDa < **hGH** 22 kDa < **Factor IX** 55 kDa

Hydrophobicity

Chemotherapeutic Agents

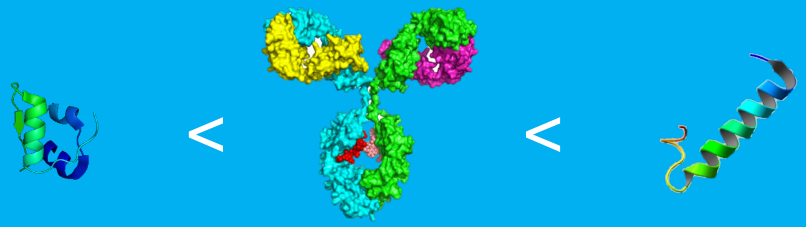


Doxorubicin



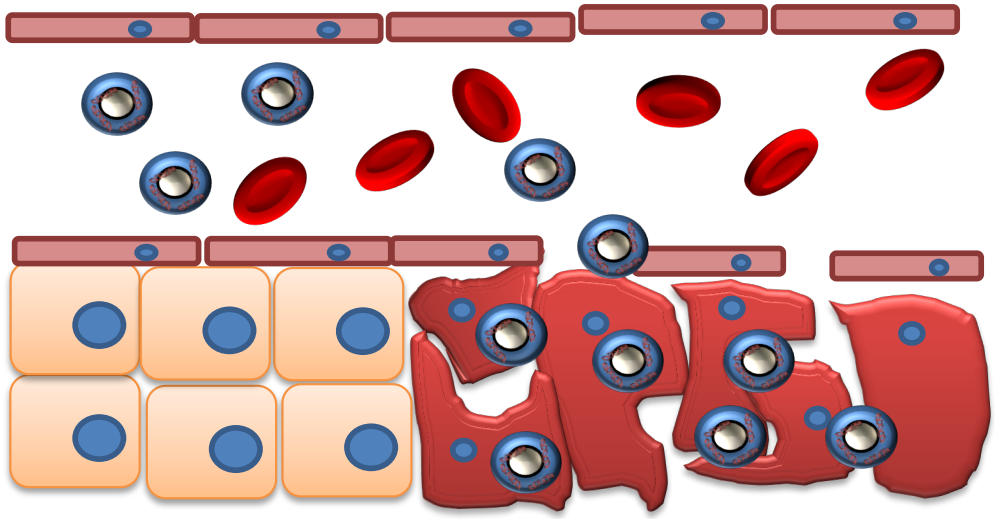
Paclitaxel

Isoelectric Point



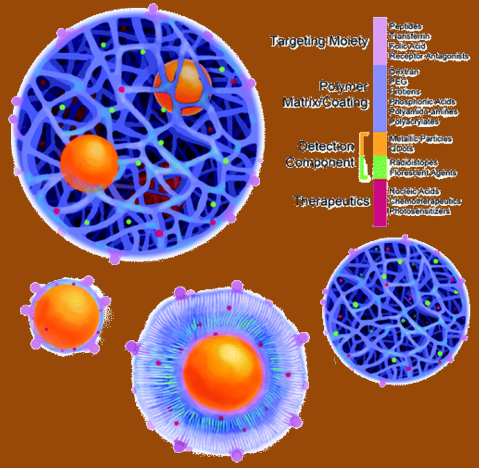
Insulin pI 5.4 < **Humira** pI 8.1 < **Calcitonin** pI 8.86

Bionanotechnology



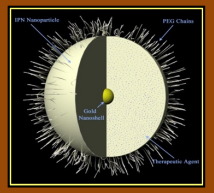
Novel biomaterials that respond in a programmed manner to *biological stimuli*

Targeted Delivery and Theranostics

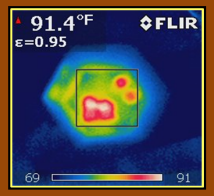


Externally Responsive Nanoparticles

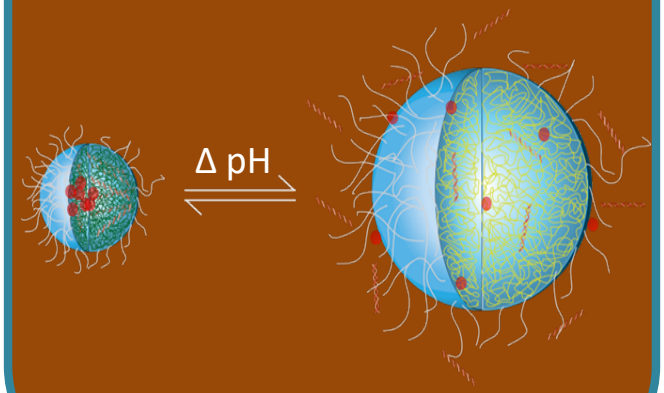
Gold-Polymer Nanoparticles



Magnetic nanoparticles



Biologically-Triggered Nanoparticles

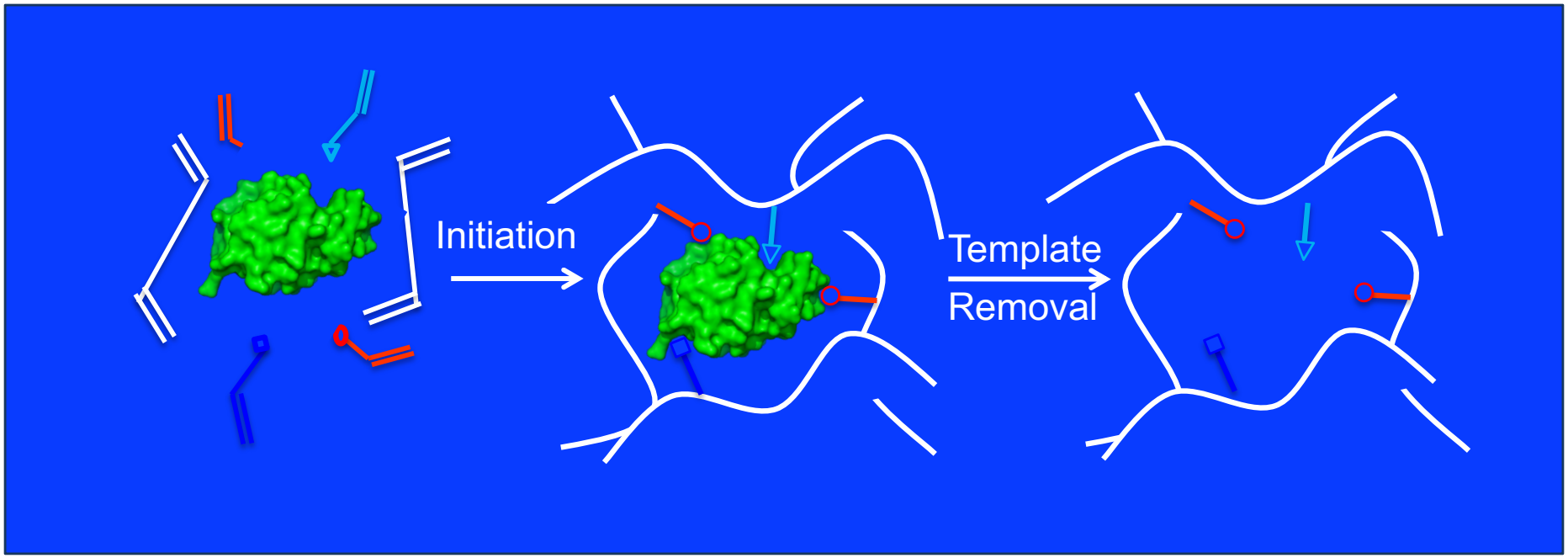


Major Disease Targets and Therapeutics

Multiple Sclerosis	Interferon-β **HEIDI, FABIOLA**
Crohn's Disease	High Isoelectric Point Protein Drugs **HEIDI, OLIVIA**
Cancer	Chemotherapy, siRNA, Interferon-α DENNIS
Ulcerative Colitis	siRNA **OLIVIA, AALIYAH**
Glioblastoma	mRNA **DEIDRA**
Osteoporosis	Calcitonin
Macular Degeneration	Various **JESUS**
Cancer	Various **DENNIS**

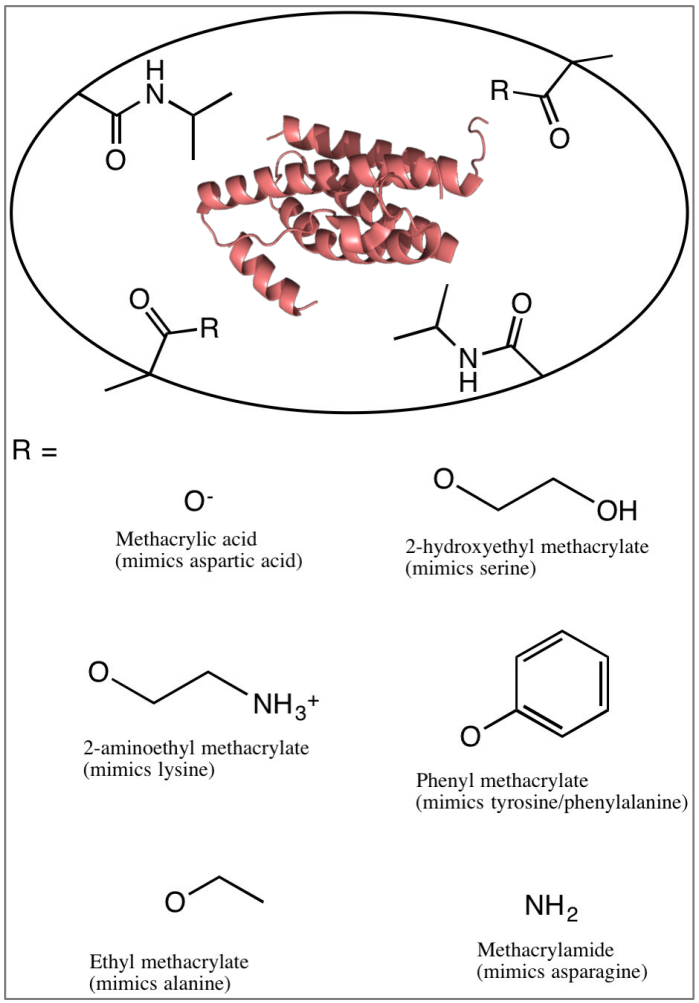
Molecular Recognition

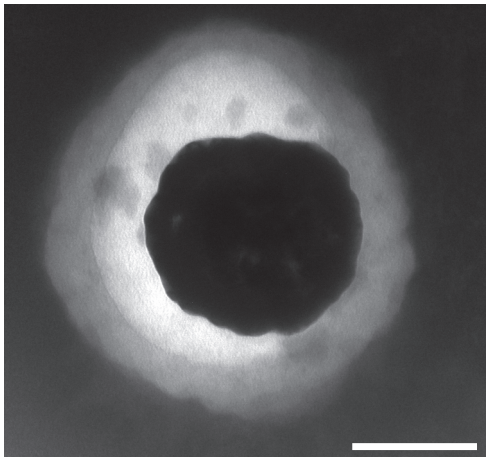
Functional monomers are polymerized in the presence of a biomolecule of interest. Following purification, these polymers have recognitive moieties. Applications include *low cost biosensors, drug delivery, and regenerative medicine*.

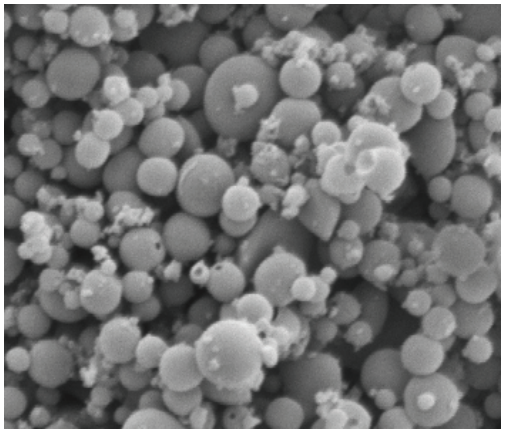


Biosensing

Nanoscale, synthetic polymers with molecular recognition properties for use in the design of *optical sensor arrays for diagnostic applications*.





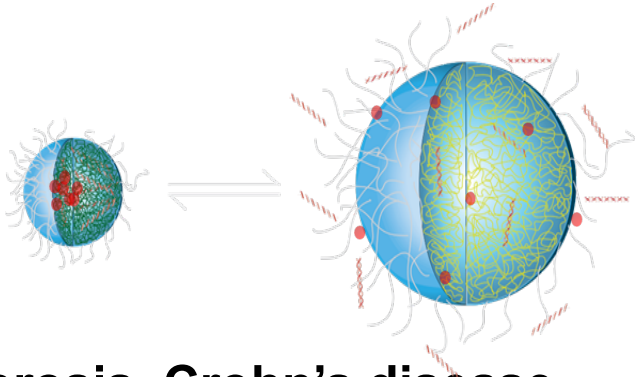


Overview of Peppas Laboratory Research

Projects for Qualified BME and CHE PhD students

EXAMPLES

1. Two- and three-biomarker recognition systems for new biosensors to detect autoimmune diseases
2. Core/shell nanoparticles from novel biodegradable carriers for antibody delivery



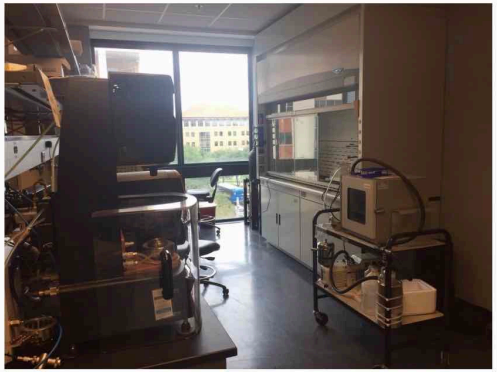
3. Novel polymer networks for delivery
4. **Diseases: Glioblastoma, multiple sclerosis, Crohn's disease,**
5. **Cancer, Cardiovascular diseases**
6. **Fundamental studies in polymer networks**

Peppas Laboratory

Laboratories in the Biomedical Engineering Building

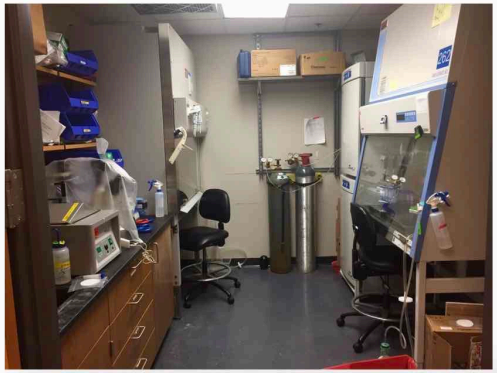
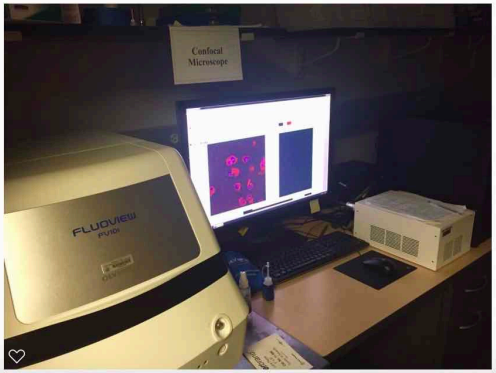
1 Postdoc
10 Graduate Students
26 Undergraduate Students

Peppas Laboratory





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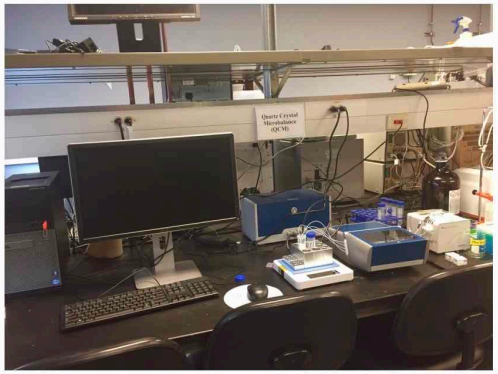


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