Organic, Polymer, Nano Material Chemistry Research

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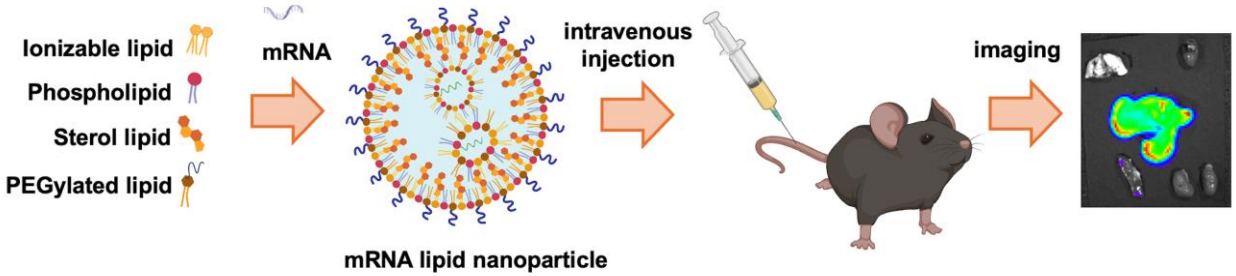
mRNA medicine

- **Dr. Chandrabali Bhattacharya**
- Assistant Professor
- Department of Chemistry and Biochemistry
- Email: chandra.bhattacharya@unlv.edu
- Website: https://bhattacharya-lab.faculty.unlv.edu/

Expertise

- Biomaterials
- Drug and Gene Delivery
- Chemical Biology
- Medicinal Chemistry



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Dr. Pradip K. Bhowmik
Materials Chemistry Lab

Our interests focus on organic and polymer synthesis in general. More specifically, we are interested in developing novel light-emitting and liquid-crystalline polymers for their multitude applications in modern technology, including biosensors.

In another project, we are developing ionic liquids and ionic liquid crystals for their better ionic conductivities as electrolytes for next generation batteries. Significant efforts are concentrated on the development organic ionic plastic crystals for the solid state batteries.

Carbon nanotube-based composite materials based on ionic polymers are of significant interest in our group. In recent years, we are also actively pursuing the development of cisplatin analogs for cancer therapy.

Colorful Pyrylium Salts

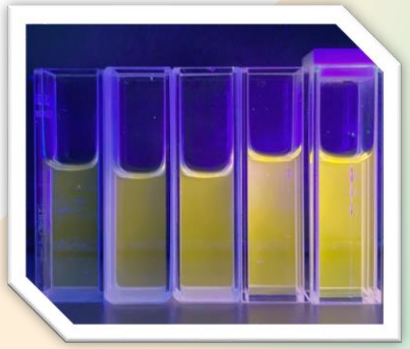
Liquid Crystalline Texture

Fluorescent Pyrylium Solution

Dr. Pradip K. Bhowmik Materials Chemistry Lab

Current Research Interests

- Thermotropic and Lyotropic Liquid Crystalline Polymers
- Polyesters, Viologen Polymers, Poly(pyridinium salt)s
- Fire Retardant Polymers
- Light-Emitting Properties of Polymers
- Photo-responsive Polymers
- Proton and Anion Exchange Membranes
- Oxidation of Carbohydrates by Viologens
- Ionic Liquids, Liquid Crystals, and Plastic Crystals
- Novel Light-Harvesters for Solar Energy Storage
- Fluorescent Molecules for Cell Imaging
- Pyrylium Salt Chemistry
- Lasing Properties in Organic Solvents and Water
- Two Photon Induced Absorption Fluorescent Properties
- Piezochromic Materials
- Magnetic Materials
- Cisplatin Analogues for Cancer Therapy



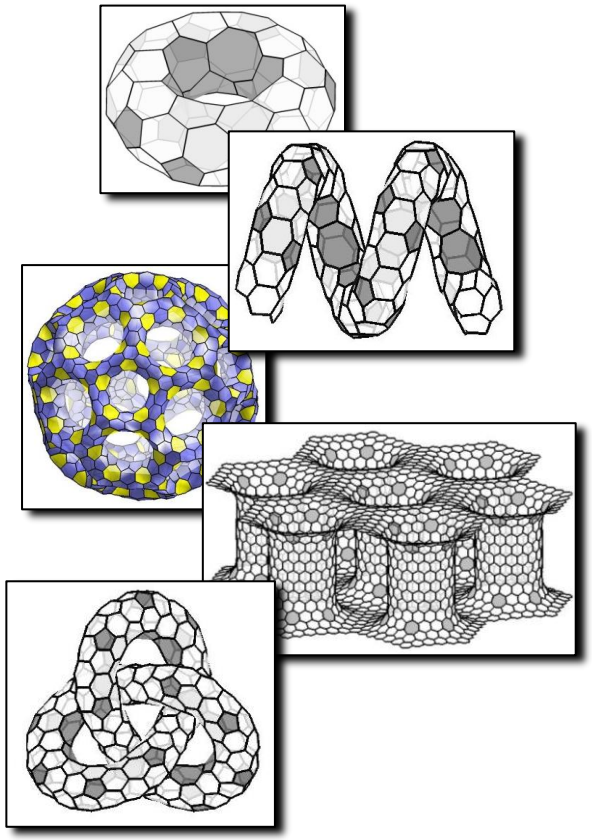
Polymer Flame Testing

Theoretical chemical physics

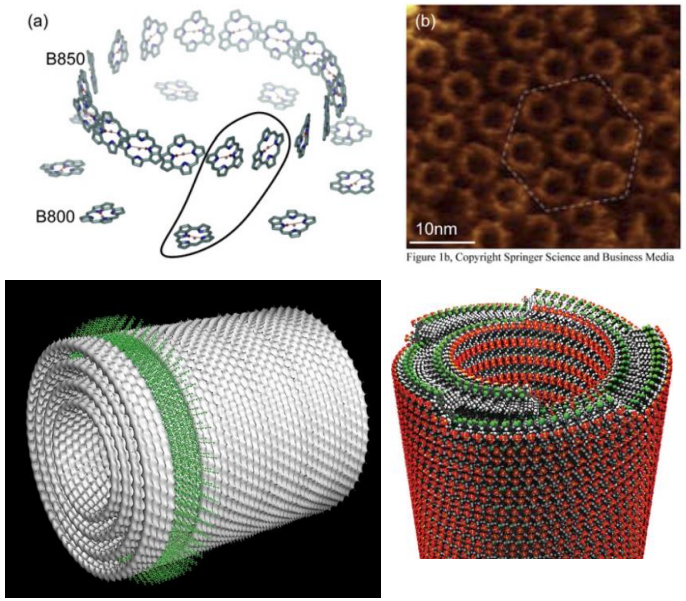
- Dr. Chern Chuang,
- Assistant Professor, Department of Chemistry and Biochemistry
- Email: chern.chuang@unlv.edu
- Website: http://cchuang.faculty.unlv.edu/Home.html

- Expertise
  - Open quantum system dynamics and spectroscopy
  - Photophysics and photochemistry of materials
  - Quantum transport
  - Quantum effects in biology
  - Exotic geometries and topologies of low dimensional materials

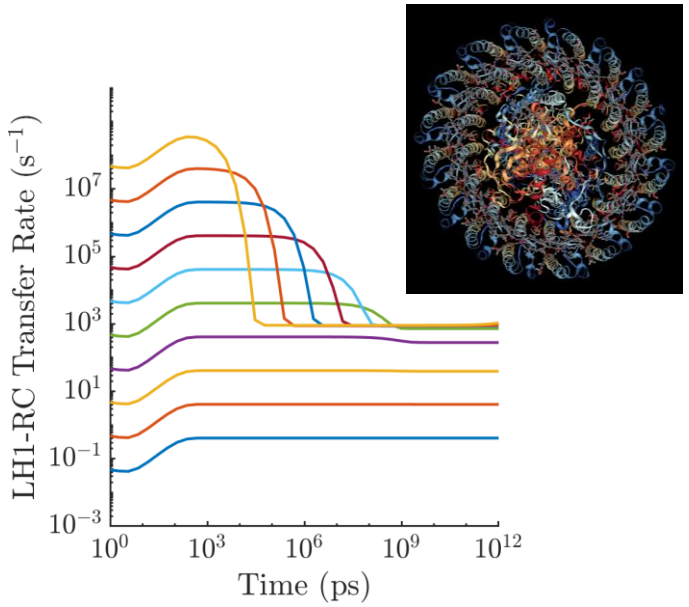
Theoretical chemical physics

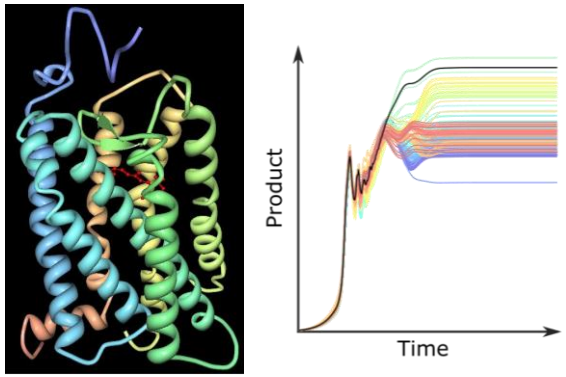


Exotic low-dimensional materials



Photophysics of organic materials

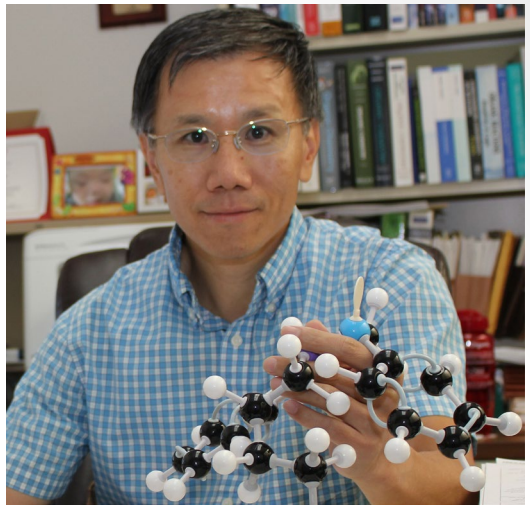




Photochemistry under environmental control

Jun Yong Kang

- Assistant Professor, Department of Chemistry and Biochemistry
- Ph.D., Chemistry, Texas A&M University, College Station, TX
- CHE 217B, junyong.kang@unlv.edu
- http://jkang.faculty.unlv.edu/?page_id=110



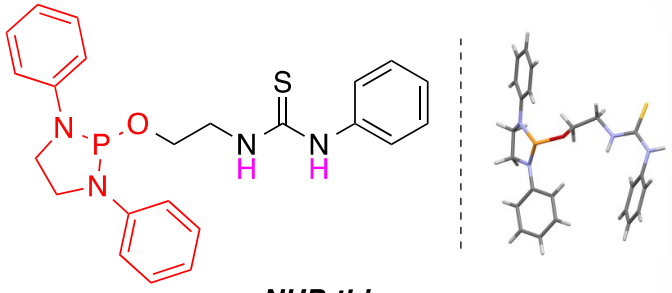
Areas of Expertise

- Synthetic organic chemistry
- Development of new synthetic methodology
- Asymmetric organocatalysis
- Organophosphorus chemistry
- Synthesis of bioactive small molecules

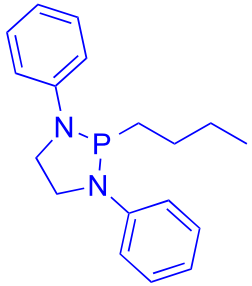
Research Summary:

The development of new synthetic methodologies plays a key role in medicinal chemistry, biochemistry, and materials chemistry. Professor Kang and his group have been developing novel synthetic transformation and new chemical reagents such as commercially available NHP-thiourea and NHP-butane to apply for pharmaceuticals and bioactive molecules.

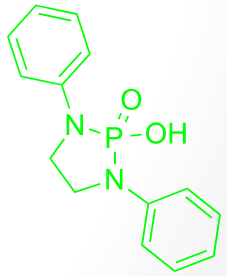
Kang's reagents-commercially available at Kerafast



NHP-thiourea
(phosphonylation reagent)



NHP-butane
(organocatalyst)



NHPA
(organocatalyst)

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Organic Materials Chemistry

Dong-Chan Lee, Ph.D.

Associate Professor

Department of Chemistry & Biochemistry

Phone: 702-895-1486

Email: dong-chan.lee@unlv.edu

Expertise

- Organic semiconductors with tunable electronic properties
- Self-assembly (nanomaterials, organogels, etc.)
- All organic room-temperature phosphors
- Materials development for solid-state emission with high quantum yield

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Electronic-Property Tuning with Smart Molecular Design

E_{LUMO}

-3.16 eV

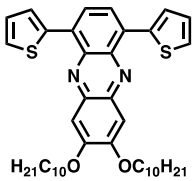
-3.26 eV

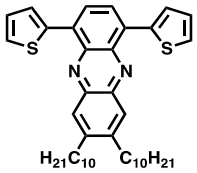
-3.22 eV

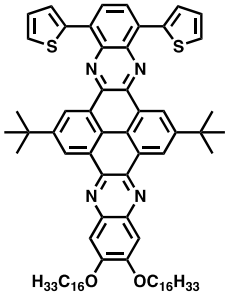
-3.89 eV

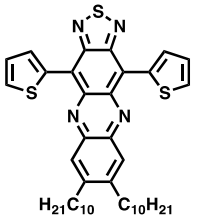
-3.80 eV

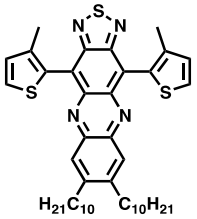
-3.84 eV

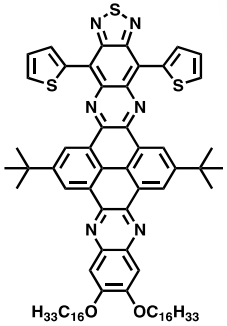












E_{HOMO}

-5.43 eV

-5.45 eV

-5.49 eV

-5.32 eV

-5.51 eV

-5.40 eV

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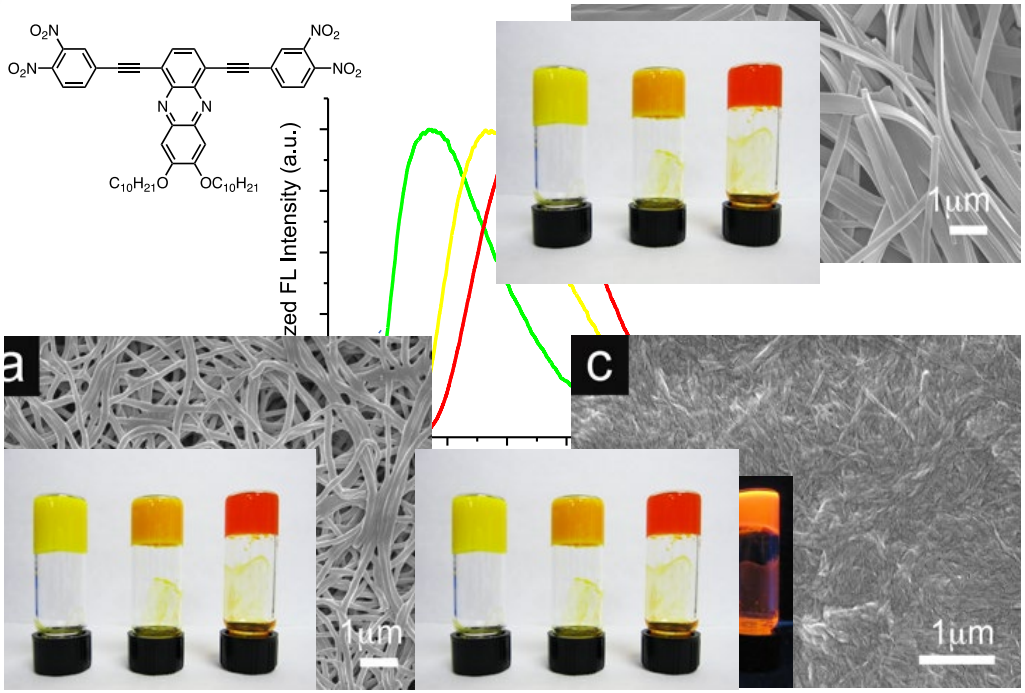
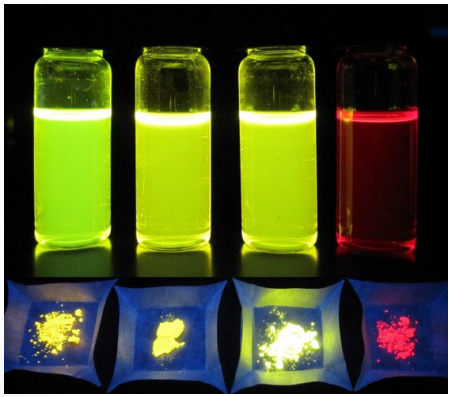
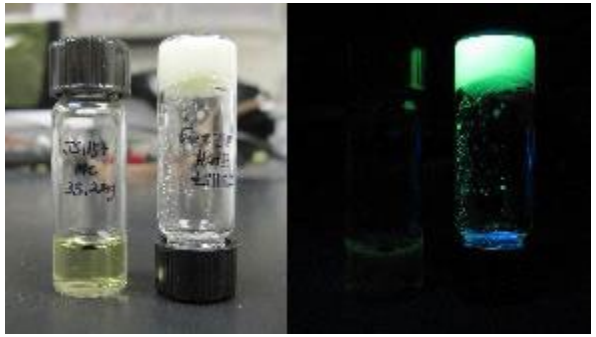
Solvent-Dependent Morphology Control through Organogelation





Solid-State Emission with High Quantum Yield



Gel-Induced Room Temperature Phospho-rescence

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Inorganic Radiochemistry

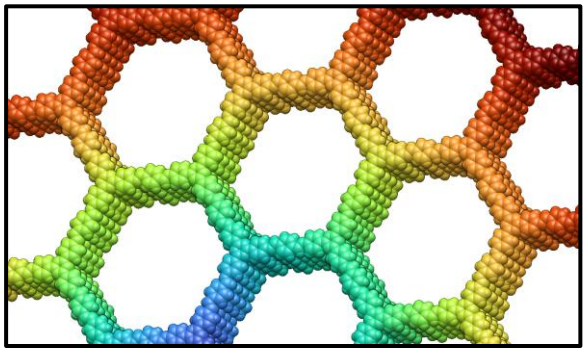
- **Dr. Matt Sheridan**
- Asst Professor - Radiochemistry
- Department of Chemistry and Biochemistry
- Email: matthew.sheridan@unlv.edu
- Research works: https://scholar.google.com/citations?user=axFxtuQAAAAJ&hl

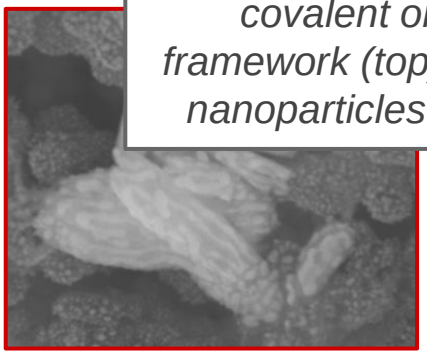
- **Materials chemistry:**

  metal organic frameworks (MOF), covalent organic frameworks (COF), oxide electrodes, uranium and actinide nano-materials
- **Electrochemistry & photochemistry:**

  actinide redox chemistry, photoactive materials, molten salts, artificial photosynthesis
- **Radiochemistry:**

  fuel cycle chemistry, actinide separations, actinide coordination chemistry, scintillation materials





covalent organic framework (top); uranium nanoparticles (bottom)

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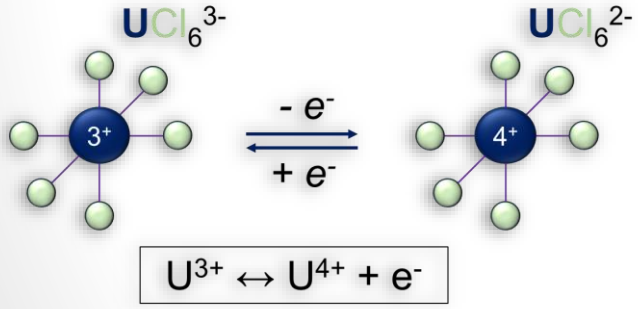
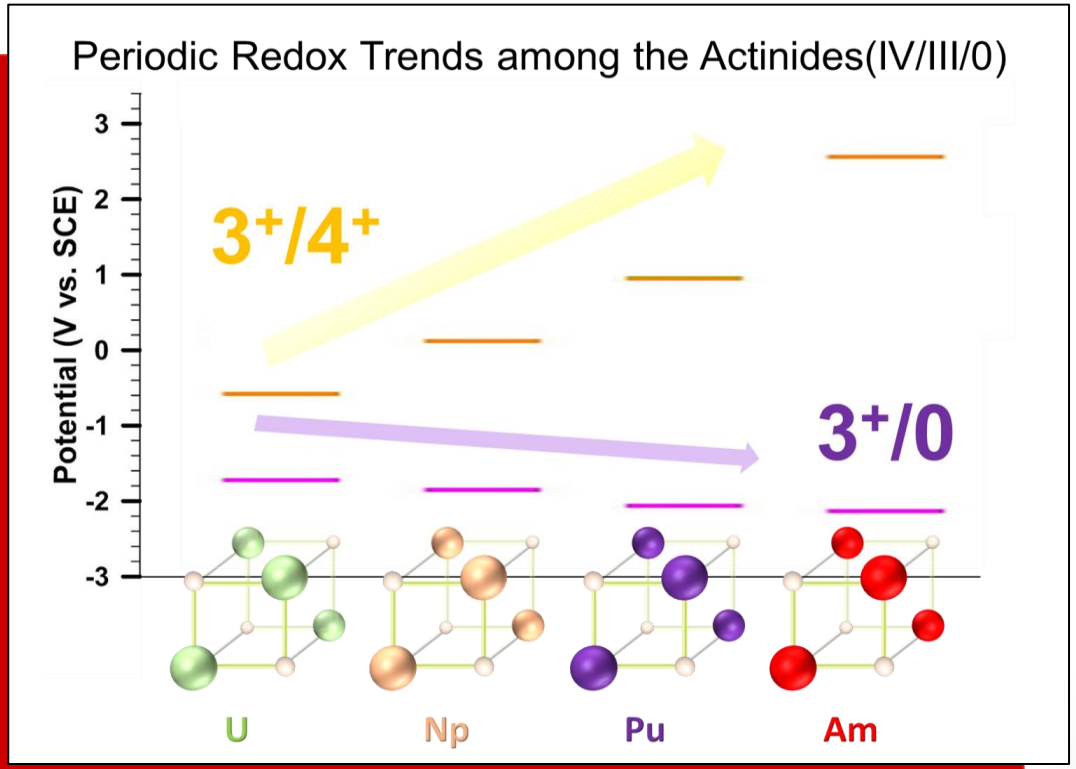
Sheridan Group Projects

Developing New Materials: MOFs, COFs, actinide complexes and nanoclusters
Studying Redox Radiochemistry: Molten salt electrochemistry, actinide oxide materials semiconductor properties

The actinides–uranium (**U**), neptunium (**Np**), plutonium (**Pu**), and americium (**Am**)–**undergo rich redox chemistry**





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