

# Chemistry

# Top Careers in Chemistry

OCCUPATION	JOB SUMMARY	ENTRY-LEVEL EDUCATION	MEDIAN PAY 2021
Federal government	Work on regulatory compliance, etc.	BS - PhD	\$117,850
Research and development	Common to work in diverse setting on complex problems	PhD or MS	\$101,180
Chemical manufacturing	Investigate possible new products and ways to improve existing ones	BS	\$77,740
Testing laboratories	May work on environmental protection or other problems requiring accurate tests	BS	\$61,190
Waste management and remediation services	May design chemical processes and products that are environmentally sustainable	BS	\$54,160

# Employment outlook

Occupation	Employment - 2021	Projected Employment - 2031	Change, 2021-31	
			Percent	Numeric
Chemists and materials scientists	90,600	96,300	+6 %	5,700
Materials scientists	7,000	7,400	+6 %	400
Chemists	83,600	88,900	+6 %	5,300

# Largest employers in Chemistry

OCCUPATION	% OF TOTAL
Chemical manufacturing	33%
Research and development in the physical, engineering, and life sciences	17
Testing laboratories	9
Federal government, excluding postal service	7
Administrative and support and waste management and remediation services	4

# Examples jobs for chemists

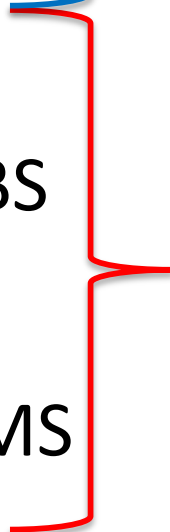
- **Analytical chemists** determine the structure, composition, and nature of substances.
- **Forensic chemists** analyze evidence for clues to help solve crimes.
- **Inorganic chemists** study the structure, properties, and reactions of molecules that do not contain carbon, such as metals.
- **Medicinal chemists** research and develop chemical compounds that can be used as pharmaceutical drugs.
- **Organic chemists** study the structure, properties, and reactions of molecules that contain carbon.
- **Physical chemists** study the fundamental characteristics of how matter behaves on a molecular and atomic level and how chemical reactions occur.
- **Theoretical chemists** investigate theoretical methods that can predict the outcomes of chemical experiments.

# Earning degrees in the field

- BS in chemistry
  - Typically, 4 years of study
- MS in chemistry
  - Typically, 2 years of study past the BS
- PhD in chemistry
  - Typically, 3 years of study past the MS

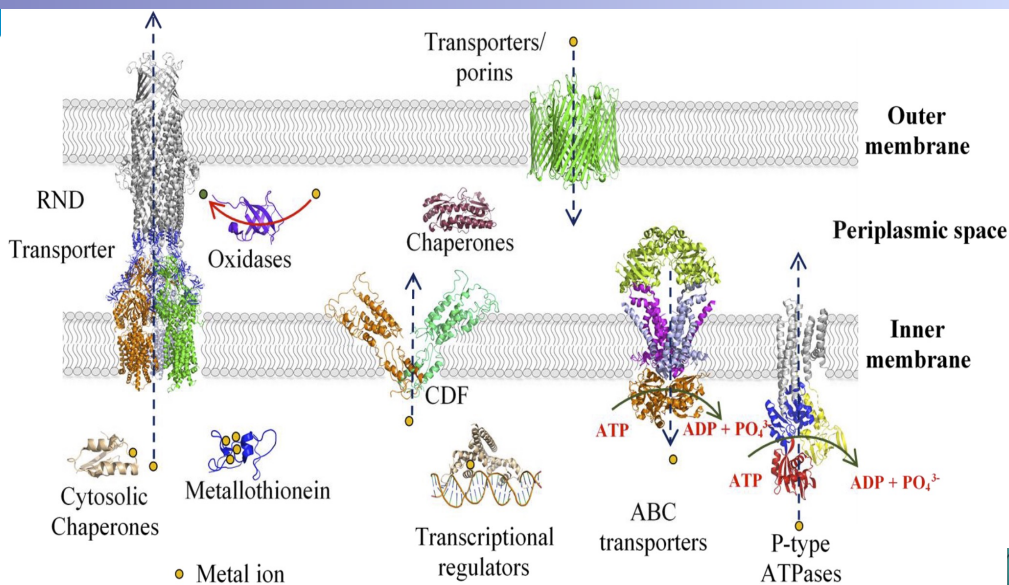
A blue bracket on the right side of the slide, grouping the BS and MS degree items from the list above.

**UTD offer  
Financial  
aid and  
other help**

A red bracket on the right side of the slide, grouping the MS and PhD degree items from the list above.

**Many times  
– one can  
be paid to  
earn these  
degrees**

# Bioinorganic chemistry of transition metals homeostasis: transmembrane metal transporters and associated metalloproteins

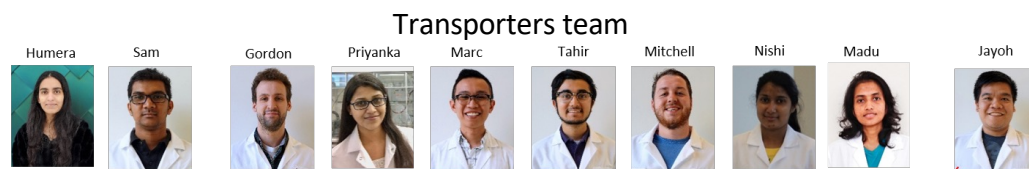


**The Meloni lab focus on understanding selectivity, promiscuity, kinetics, energetics and transport mechanism in metalloproteins important for metal metabolism in health and disease.**

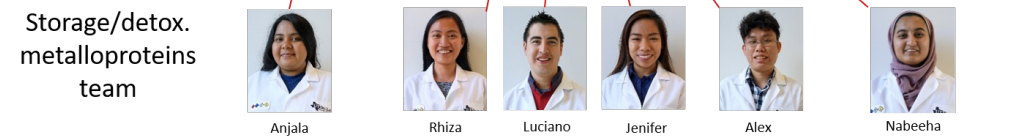
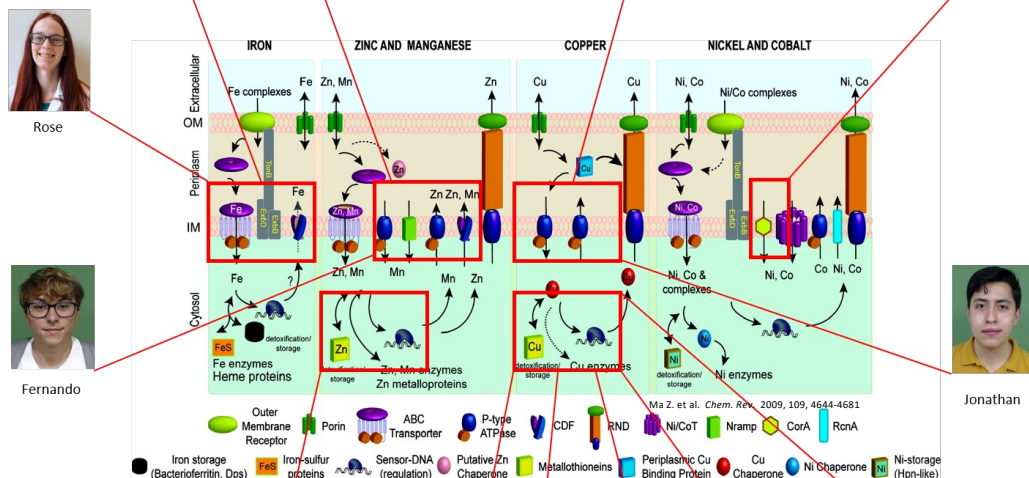
## A multidisciplinary team of talented students:

Molecular biology  
 Recombinant protein expression, purification and analysis  
 Enzymology and enzyme kinetics  
 Membrane protein reconstitution  
 Spectroscopy and structural biology  
 Analytical techniques

Dr. Gabriele Meloni  
 Email: [gabriele.meloni@utdallas.edu](mailto:gabriele.meloni@utdallas.edu)  
 Website: [www.melonilab.org](http://www.melonilab.org)



Transporters team



Storage/detox. metalloproteins team



## Polymers for Sustainable 3D Printing – Smaldone Lab – NS&M Chem

### The Problem With Plastics



- petroleum feedstocks
- single use / low recycling

### 3D Printing as a Solution

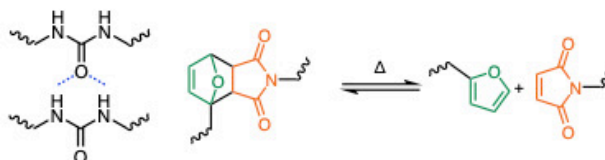
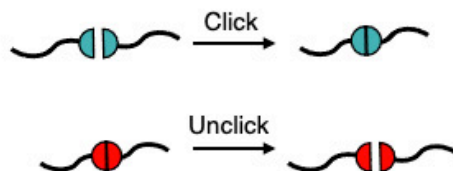


on demand  
production



reduced  
waste

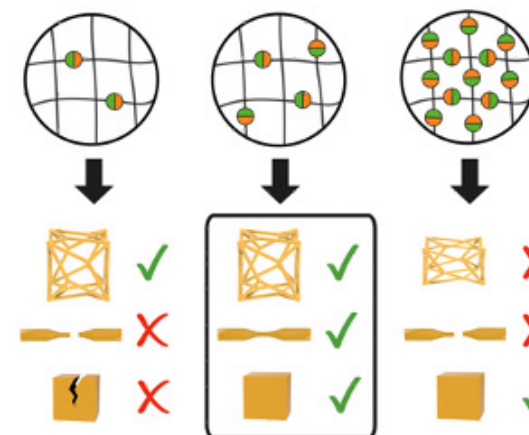
### Chemistry to Make and Break Bonds



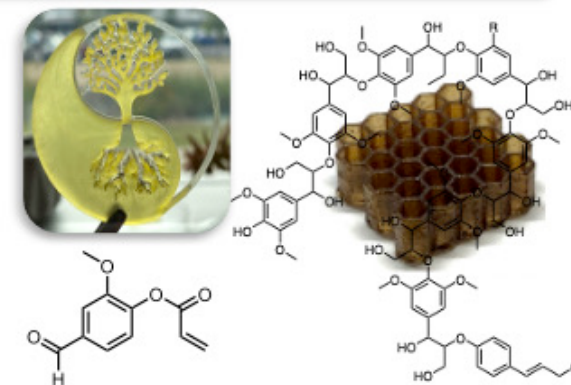
reversible and controllable  
chemical bonds



recyclable.....



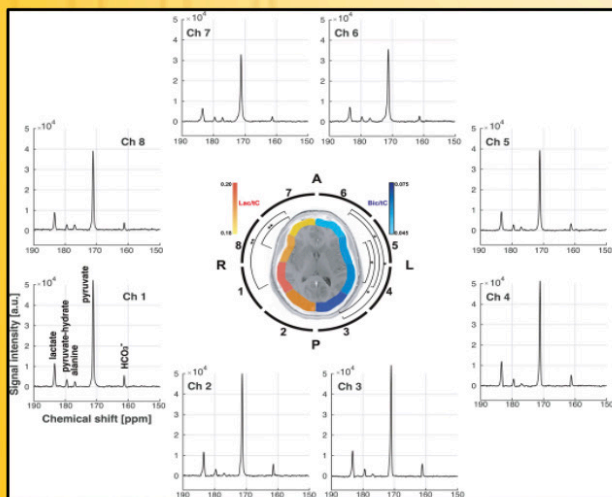
improved lifespan / repairable



....and renewable!

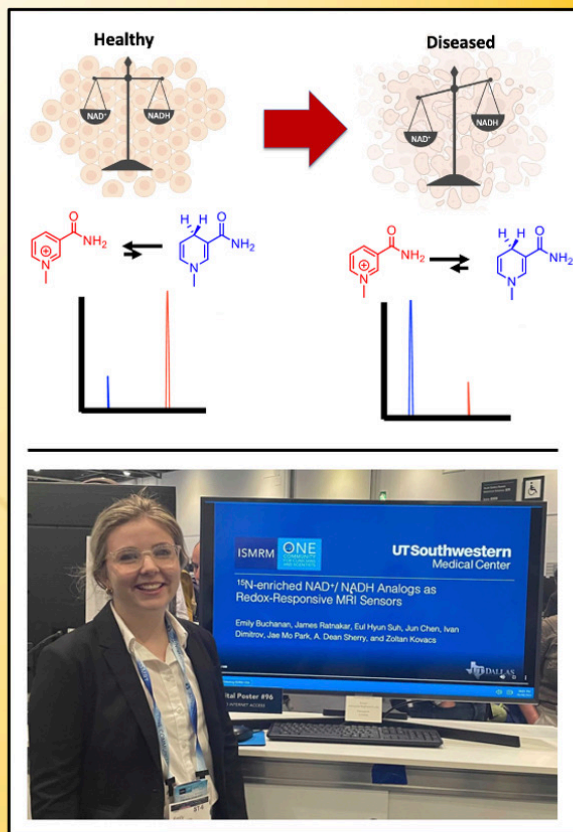


## Dean Sherry Lab: Probing disease using advanced MRI/NMR Technology and novel MRI contrast agents



### Hyperpolarized Carbon 13 Agents

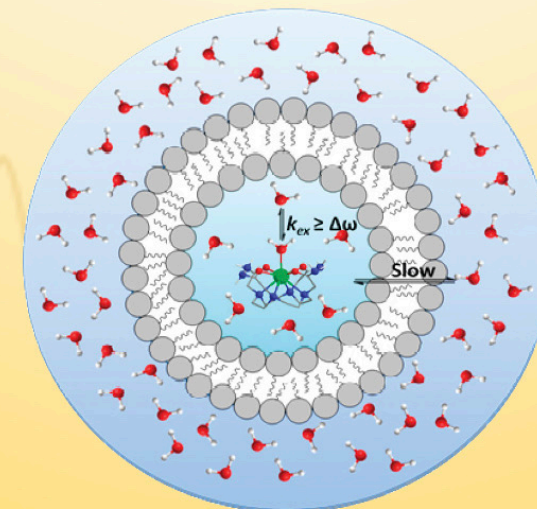
Boosting MRI signal more than 10,000 times to watch how nutrients are processed in the body in real time



### Designing "Smart" Redox Sensors

Hyperpolarized N15 biomimetic molecules that change during disease and tissue damaged

Undergraduate Emily Buchanan presenting this project at ISMRM Meeting in London (2022)



### Chemical Exchange Saturation Transfer (CEST) Imaging

Designing 3D molecules to capture and exchange with water to look at changes in tissue structure and probe the speed of water movement across biological membranes

Questions?