Development of Divergent Organic Transformations towards the Synthesis and Functionalization of Bioactive Molecules

Dr. Raghuram Gujjarappa

Post-doctoral fellow of Chemistry

Sotiriou-Leventis group, Missouri S&T



Chemistry Seminar on the synthesis of bioactive molecules

Monday Nov 16 at 4 pm in 126 Schrenk

Please contact Dr. Amitava Choudhury at choudhurya@mst.edu for further information.

MISSOURI S&T

Abstract: The importance of diverse organic transformations is reflected in their widespread use in medicinal chemistry and drug discovery. Strategies such as transition-metal catalysis, metal-free methods, and organocatalysis are essential for designing bioactive compounds. Catalysis is essential to modern chemistry and industry because it accelerates reactions, reduces energy requirements, and can improve efficiency while minimizing waste. Organocatalysis, which uses small organic molecules as catalysts, offers a versatile and often environmentally attractive approach: it can avoid the need for metals, operate under relatively mild conditions, and enable precise control over how molecules are formed. Together, catalysis and organocatalysis support more sustainable chemical processes and help researchers develop valuable medicines, materials, and other products.

Heterocycles are widely used in pharmaceuticals, where they form key components of many medicines, and they also play important roles in agrochemicals, dyes, materials science, and biological research. This study focuses on developing new methodologies using these approaches to synthesise a wide range of *N*-heterocycles and structurally valuable intermediates. The synthesis of pyridine, azole, quinoxaline, and quinazoline frameworks using readily available building blocks is described.[1]

In another, a family of single-stranded macrocyclic receptors, thiohemicucurbit[n]urils, were synthesized mechanochemically using anion templating. These macrocycles show conformational adaptability, binding a range of anionic guests by independently adjusting the tilt angles of all eight subunits to optimize anion recognition.[2]

References:

[1] R. Gujjarappa, http://hdl.handle.net/10603/444442.

[2] R. Gujjarappa *et al.*, *Cell Rep. Phys. Sci.* **2024**, *5*, 102011.

About the speaker: Dr. Raghuram Gujjarappa received his Master of Science degree in Organic Chemistry from Bangalore University, India, in May 2014. He then worked briefly as a Research Associate at the Bristol Myers Squibb-Biocon Research Center in Bangalore. From 2016 to 2021, he pursued a Ph.D. in Organic Synthesis under the supervision of Dr. Chandi C. Malakar in the Department of Chemistry at the National Institute of Technology Manipur, India. In August 2021, he joined the research group of Prof. Ofer Reany and Prof. Ehud Keinan at the Technion–Israel Institute of Technology as a postdoctoral fellow, where he worked on the synthesis and applications of sulfur-containing macrocycles, including bambusurils and cucurbiturils. In April 2025, he moved to Prof. Jurriaan Huskens's research group at the University of Twente in the Netherlands as a visiting postdoctoral fellow, focusing on anion transport by macrocycles. Since December 2025, he has been a postdoctoral fellow in the Department of Chemistry at Missouri University of Science and Technology in Rolla. Under the supervision of Dr. Chariklia Sotiriou-Leventis, he is developing small catalytic molecules and translating them into functional textile platforms for organophosphate decontamination. His areas of specialization include synthetic organic chemistry, catalysis, and supramolecular chemistry.