DEPARTMENTS OF CHEMISTRY
Seminar Series

FRIDAY, September 27, 2024 - 12:00 Noon
MC H313

The New Chemistry of Old PN cages: Universal Inorganic Connectors

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We are developing small phosphorus-nitrogen (PN) cages and rings into new covalent connectors from which additional functional groups can be propagated at precisely-controlled radial and angular separations. Traditionally, organic molecules like adamantanes, aryls, acetylenes, tetraarylmethanes, etc. have been used in such scaffolding roles due to their ability to covalently link functional groups in well-defined arrangements, leading to applications in materials chemistry, catalysis, and pharmaceutical chemistry. The inorganic PN connectors we have developed in this context are much easier to synthesize and derivatize, offer a phosphorus NMR handle, and fill a geometric gap between the organic connector sizes currently available. They can also be attached to nearly any element via robust and clean reactions. Exploiting their universal connectivity, we are using them as modular synthons for new classes of inorganic or hybrid organic-inorganic polymers and materials. This talk will show how our exploration of the PN "connectome" is revealing the design rules for accessing linear, networked, amorphous, or crystalline inorganic materials (e.g. MOFs), featuring elements across the periodic table.

References: Chitnis, et al.: *Chem. Commun.*, **2024**, *60*, 2629; *J. Am. Chem. Soc.*, **2023**, *145*, 7569; *Chem. Mater.*, **2023**, *35*, 8338; *Angew. Chem. Int. Ed.*, **2022**, *61*, e202204851.