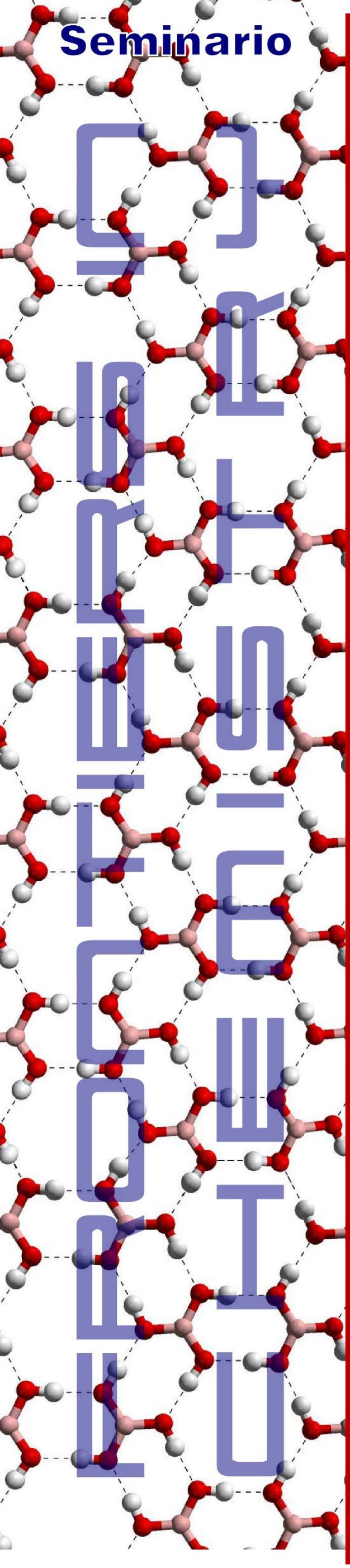

Università degli Studi di Padova
Dipartimento di Scienze Chimiche

Ciclo di Seminari 'Frontiers in Chemistry'

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Building and Exploiting Driving Forces in Organic Synthesis

Martedì 10 Giugno 2025, ore 11.30
Aula A, Dipartimento di Scienze Chimiche, Via Marzolo 1 - Padova

This lecture will cover two topics concerning unusual, novel heterocyclic scaffolds, and aspects of their chemistry driven by entropy and enthalpy. The first concerns oxidised thiophenes – 'thiophene *S*,*S*-dioxides' – that are excellent candidates for Diels-Alder cascade reactions that are entropically driven by the loss of SO_2. Topics to be discussed include the development of routes to aromatic illuldalane natural products,[1] and a unified synthesis of the Strychnos alkaloids. Mechanistic aspects of the cycloadditions, and applications in methodology contexts, will also be included. In the second part of the lecture, recent work on a new generation of propellanes – heteroatom-containing [3.1.1]propellanes – will be described.[3] The development of these molecules required a new synthetic strategy compared to carbocyclic propellanes, which can be conducted on multigram, or even decagram, scale. These enthalpically-strained but surprisingly stable molecules display highly unusual reactivity trends, and offer direct access to hetero-bicyclo[3.1.1]heptanes which are of high interest in drug design.

References:
[1] Collective Synthesis of Illudalane Sesquiterpenes via Cascade Inverse Electron Demand (4 + 2) Cycloadditions of Thiophene S,S-Dioxides K. H. K Park, N. Frank, F. Duarte, E. A. Anderson, *J. Am. Chem. Soc.* **2022**, *144*, 10017–10024.
[2] Collective asymmetric synthesis of the Strychnos alkaloids via thiophene S,S-dioxide cycloaddition cascades K. H. K. Park, J. Park, N. Frank, H. Zhang, F. Duarte, E. A. Anderson, *ChemRxiv* doi 10.26434/chemrxiv-2024-tk00d.
[3] Hetero[3.1.1]propellanes R. I. Revie, A. Dasgupta, Y. Biddick, K. E. Christensen, R. C. Smith, E. A. Anderson, *ChemRxiv* doi 10.26434/chemrxiv-2024-tnx0l.

Prof. Stefano Mammi
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Corso di Dottorato in Scienze Molecolari

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