

# Metal-organic assemblies for capture and detoxification of harmful molecules

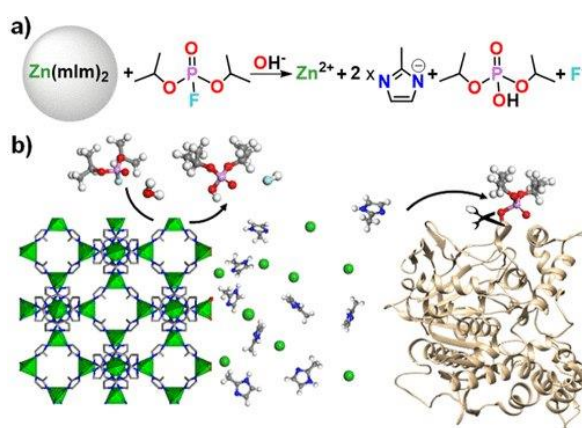
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The high demand of food of the ever increasing global population involves the extensive use of agrochemicals to increase crop production. However, this goal also poses real threats to human health (110,000 deaths/year and 5 million pesticide related illnesses), aquatic ecosystems, and the environment at large. One of the most common classes of pesticides, organophosphates (OPs), are highly toxic to humans and ecosystems as a consequence of their vital enzymes inhibitory activity. A related concern is the deliberate contamination with highly toxic organophosphate compounds as a consequence of the action of destabilizing groups. Finally, another problem associated with agricultural sustainability is the extensive use of phosphate fertilizers from non-renewable phosphate rock sources and their leaching to soil/aquatic media leading to severe environmental problems.

In this seminar, I will summarize some results of our group of what reticular materials can offer to remediate this paramount health and environmental threat. Specific topics to be discussed include:

- Capture and detoxification of organophosphates<sup>1</sup>
- Reactivation of organophosphate inhibited AChE (Figure 1)<sup>2</sup>
- Phosphate recovery from waste water<sup>3</sup>



**Figure 1.** Organophosphate detoxification and acetylcholinesterase reactivation triggered by zeolitic imidazolate framework structural degradation

<sup>1</sup> R. Gil San-Millan et al *J. Am. Chem. Soc.* 2019, 141, 30, 11801-11805; C. Perona, E. Borrego, et al. *J. Mater. Chem. A*, 2024, 12, 1772-1778; C Perona-Bermejo, et al. *Adv. Funct.l Mater.* 2024, 2405785.

<sup>2</sup> P Delgado et al. *ACS Appl. Mater. Interfaces* 2022, 14, 26501–26506; J. Martín-Romera et al. *ACS Appl. Mater. Interfaces* 2024, 16, 26501–26506

<sup>3</sup> L. Gonzalez et al. *J. Mater. Chem. A*, 2022, 10, 19606-19611; L González, et al. *Materials Today Chemistry*, 2022, 100596