

EINLADUNG

Im Rahmen der gemeinsamen Kolloquien der Fakultät für Chemie und Chemische Biologie der Technischen Universität Dortmund hält

Prof. Dr. George Shimizu

University of Calgary

einen Vortrag mit dem Thema:

"Translating Coordination Chemistry Research from Lab to Industrial Applications"

With a wealth of strategic global challenges, chemistry can potentially offer solutions but there is always a challenge to translate benchtop work to real-world applications. This presentation will deal with three short stories spanning our efforts to design new porous solids while keeping an eye on real-world applications. Metal-organic frameworks (MOFs) are porous network solids that can be used like a sponge to trap selected gases and release them under some external stimulus (e.g., pressure drop, temperature increase). Such an approach has been challenging for post-combustion carbon capture owing to the presence of water and acid gases in the stream. We have developed a solid [1] that has moved up the technology ladder, with different academic and industrial partners [2], to actually be capturing CO₂ industrially at 25 tonnes per day scale. I will discuss some of the basic science and also the hurdles to translate from milligrams to industrial demonstration including the key aspect of being able to physisorb CO₂ in the presence of water.[3] The second part will deal with a new approach to make MOFs. MOFs typically rely on a reticular (net-based) approach where metal and organic linkers define a topology and pore sizes. We have developed a new route to MOFs where the guest molecules can play a much greater role - rather than simply filling the void, guests can determine pore structure. This approach relies on robust H-bonded intermediates[4,5]. Results on the use of this approach for xylene isomer separation will be presented. [6] The final part concerns a non-framework approach, using a simple coordination chemistry, to develop a system to selectively extract vanadium from industrial wastewater streams. Vanadium is a critical mineral present in many residual waste from petroleum and coal processing. We use a cyclic imidedioxime to selectively bind vanadium but also to precipitate it selectively from real oilsands tailings.[7]

[1] Shimizu, G. K. H., Rajendran, A., Woo, T. K. and coworkers, *Science* **2021**, 374, 1464.

[2] P. Hovington et al. Proceedings of the 15th Greenhouse Gas Control Technologies Conference 15-18 March 2021,

[3] Shimizu, G. K. H., Rajendran, A., Woo, T. K. *Adv. Mater.* **2024**, 36, 2301730.

[4] Shimizu, G. K. H. and coworkers, *CHEM.* **2018**, 4, 868

[5] Shimizu, G. K. H. and coworkers, *J. Am. Chem. Soc.* **2023**, 123, 21263

[6] Shimizu, G. K. H. and coworkers, **2022**, *PCT application*.

[7] Osin, O., Shimizu G. K. H. and coworkers, *Nature Commun.* **2024**, 15, Article 2614.

Zeit: Mittwoch, 07.10.2026, 16.15 Uhr
Ort: Campus Nord, Chemiegebäude, HS2

Für die Dozenten der Chemie

Im Auftrag des Dekans

Kontakt: Prof. Sebastian Henke (3976)