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Calix[n]arene based multi-functional porous materials for environmental applications

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Owing to the increasing level of attention focused on the preservation of the environment, there is a growing need for novel multi-functional materials that can meet the increasing demands from society on water resources and pollution remediation. Porous organic polymers composed of light elements that possess high specific surface areas, large pore volume and multiple functionalities are good candidate to fulfill the requirements. In particular, porous covalent organic polymers (COPs) are a promising class because of their ultrahigh hydrothermal stabilities and high yielding synthetic polymer chemistry. Calix[n]arenes (n=4, 6, 8) have long been recognized as versatile supramolecular scaffolds, however, many previous studies report the syntheses and properties of monomeric calixarenes, fewer describe their incorporation into polymers and in most of these, the macrocycles serve only as side-chain pendants. Very recently, we reported the successful synthesis of a first-in-class calixarene-based porous covalent polymer and tested its adsorption ability toward oil and organic solvents. Building on this exciting finding, we synthesized library of porous materials having different calix[n]arene homologs (n=4, 6, 8) as their backbone (BET surface area ranged from 500 to 1000 $m^2 g^{-1}$). In addition, these materials found to be super hydrophobic and therefore, we successfully implemented these materials for multiple applications including oil spill recovery, toxic dyes and micropollutants removal, iodine vapor enrichment and selective gas adsorption and separation. The high efficiency and ease of implementation of the polymer demonstrate the advantages of incorporating the calixarene moiety within a functional material and bode well for the development of calixarene-based materials for environmental applications.

Recent Publications

1. Dinesh Shetty, Ilma Jahovic, Jesus Raya, Florent Ravaux, Mustapha Jouiad, John-Carl Olsend and Ali Trabolsi (2017) An Ultra-Absorbent Alkyne-Rich Porous Covalent Polycalix[4]arene For Water Purification. *J. Mater. Chem.* A; 5: 62-66.

2. Gobinda Das, Tina Skorjanc, Thirumurugan Prakasam, Selbi Nuryyeva, John-Carl Olsenb and Ali Trabolsi (2017) Microwave-Assisted Synthesis of a Viologen-Based Covalent Organic Polymer with Redox-Tunable Polarity for Dye Adsorption. *RSC Adv.*; 7: 3594-3598.

References

1. D Wu, F Xu, B Sun, R Fu, H He and K Matyjaszewski (2012) Design and Preparation of Porous Polymers. *Chem. Rev.;* 112: 3959-4015.

2. D. Shetty, I. Jahovic, J. Raya, F. Ravaux, M. Jouaid, J-C. Olsen, T. Ali (2017) An ultra-absorbent alkyne-rich porous covalent polycalix[4]arene for water purification. *J. Mater. Chem.* A; 5: 62-66.

Biography

Ali Trabolsi has received his BSc degree in Chemistry from the Lebanese University in Beirut. He has received his Master's degree in Analytical Chemistry and also completed his PhD. Later he joined KAUST in Saudi Arabia as a Research Scientist in the Membrane Center. Presently, he is an Assistant Professor at New York University Abu Dhabi.

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