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Ultra-microporous Carbon for CO₂ adsorption

June 24, 2018 | Bldg. 101
Sunday 14:10 | Seminar Room on the 1st floor

Abstract:

N-doped carbon material with abundant micropores and basic nitrogen species have potential use for CO₂ capture. Porous carbon material with high nitrogen content was obtained by carbonizing low cost and widely available urea-based resin followed by KOH activation. The relationship between CO₂ adsorption capacity and pore size or basic N species was studied; it was found that both played crucial roles through physical and chemical adsorption mechanisms. Traditional chemical activation methods to prepare porous carbons adsorbents consume large amounts of activating agent through physical mixing. We developed a new strategy to prepare microporous carbons with uniform ultramicropores (~0.57 nm diameter) through an ionic activation method using potassium carboxylate as the activating agent, which was uniformly incorporated onto the surface of hydrothermally prepared 'hydrochar'. This strategy paves the way for a new route to prepare ultramicroporous carbons as efficient CO₂ adsorbents by using significantly lower amounts of activating agents, and hence the process may be not only cost-effective but also avoids negative aspects of traditional chemical activation.

Reference:

- [1] **Z. Liu**, Z. Yan, *et al.*, *Chem. Eng. J.*, 337 (2018) 290-299.
- [1] **Z. Liu**, Z. Yan, *et al.*, *J. Porous Mat.*, 22 (2015) 1663-1672.
- [2] **Z. Liu**, Z. Yan, *et al.*, *Nanoscale Res. Lett.*, 10 (2015) 333.
- [3] T. Cai, W. Xing, **Z. Liu**, Z. Yan, *et al.*, *Carbon*, 86 (2015) 235-244.
- [4] **Z. Liu**, Z. Yan, *et al.*, *J. Colloid Interface Sci.*, 416 (2014) 124-132.
- [5] **Z. Liu**, Z. Yan, *et al.*, *Mater. Lett.*, 117 (2014) 273-275.

Dr. Zhen Liu is an associate professor at the China University of Petroleum and mainly focuses on understanding the fundamental relationships between structure/composition and catalytic performances of porous materials. He studies the preparation of novel catalysts for typical catalytic reactions and processes, such as CO₂ adsorption by combining chemical and physical interactions; clean fuel production by means of hydrogenation, isomerization, as well as carefully controlled cracking reactions; methanol conversion to olefins by using heterogeneous catalysts, and so on. Prof. Liu studies fundamental and functional porous material synthesis for these types of catalysts.

You are cordially invited to attend!

Special Guest Seminar