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Structural features and functions of ZIF crystals made via a reaction diffusion process at room temperature

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We report the synthesis of a range of zeolitic imidazolate frameworks (ZIFs) using a reaction-diffusion framework (RDF). As the imidazolate linkers diffuse into an agar gel matrix containing the divalent metal (zinc and/or cobalt), it reacts to give the corresponding ZIF. The coupling of reaction-diffusion with nucleation, growth and impingement of the growing particles leads into controlling the particle size distribution between 50 nm and 10 μm. By varying the temperature, the concentration of the reagents, and the thickness of the gel matrix, control of the size and morphology of the ZIF crystals is achieved. Also, we show that by using the RDF, we are able to visualize the formation mechanism of ZIF crystals. This novel method for synthesizing ZIFs is rapid, scalable, and environmentally friendly. Furthermore, the effect of cobalt-doping on the photocatalytic properties of ZIF crystals is explored by examining the extent of methylene blue (MB) degradation by each ZIF under visible- light irradiation.

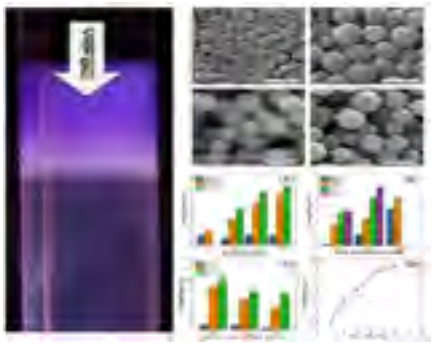

Figure 1: Synthesis of ZIFs via reaction diffusion framework.

Biography

Mohamad Hmadeh was appointed as an Assistant Professor of Chemistry at AUB in January 2014. He obtained his PhD degree in Chemistry (Jan 2010) from the University of Strasbourg (UdS) in France. His research as a graduate student was focused on molecular machines in Supramolecular Chemistry. After graduation, he joined the University of California, Los Angeles (UCLA) as a Post-doctoral fellow in the group of Professor Omar M Yaghi, who is known as one of the pioneers of Metal Organic Frameworks (MOFs). During his stay at UCLA (2010-2012), his research was focused on the design, synthesis, and characterization of novel porous and crystalline materials with exceptional gas sorption, catalysis and electronic properties. He is currently in his second year as a Post-doctoral Researcher in Professor Geoffrey Ozin's group at the University of Toronto, where he is working on synthesis and evaluation of new photocatalysts for solar fuel production.

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