Petrochemistry-2013
OMICS Group Conferences
Accelerating Scientific Discovery
World Congress on
Petrochemistry and Chemical Engineering
November 18-20, 2013 Hilton San Antonio Airport, USA

Utilization of metal organic frameworks in order to encapsulate greenhouse gas to address water availability and drought

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Abstract

Changing temperature patterns have long been known to have impact on precipitation patterns over specific regions around the Earth. For instance, El Niño which is prolonged periods of excess rainfall in the southern US and La Nina which is associated with drought in this region are all in close relation with increase in greenhouse gas emission. Therefore, any attempt in CO_2 capture and storage will indirectly lead to improve water availability and drought around the world.

Metal organic frameworks (MOFs) are new generation of porous crystalline structures with huge specific surface area and, hence, capable of being applied as gas adsorbent and catalyst. Adsorption and catalytic properties of MOFs are still subject to be improved by post-synthesis modification (PSM) which includes imparting functional groups to the organic backbone of MOF structure. As a part of this study, imparting hydroxyl group to the structurally robust MOF, ZIF-7 and evaluation of effect of the PSM on CO_2 adsorption are aimed. Another approach to the PSM of MOFs is doping an agent, e.g. a catalyst, inside the pores of MOFs results of which are synthesis of catalyst in nano scale as well as immobilization of the particles to prevent agglomeration. In the second part of this study, it is planned to grow metal oxides inside ZIF-8 structure and evaluate MOF-metal oxide composite performance in CO2 chemisorption process, carbonation-calcination cycle.

Biography

Nasser is now doing PhD at New Mexico State University, Department of Chemical Engineering. He is Research Assistant in Institute for Energy & the Environment, IEE, which is a multidisciplinary, energy and water resource serving the Southwest and beyond. He is doing research on synthesis of advanced material exhibiting prominent adsorption capacity on CO_2.