Department of **Materials Science & Engineering** seminar series 2019

3D-Printed MOF-Derived Porous Frameworks for Practical High-Energy Density Li–O_2 Batteries

Speaker: Gwendolyn Lim Jia Hao

Department of Materials Science and Engineering, Engineering, NUS, Singapore

Date: 3rd Oct 2019, Thursday
Time: 3:00 to 3:30 pm
Venue: EA-06-03

Abstract

Li–O_2 batteries are promising candidates for next-generation energy storage technologies owing to their high theoretical energy densities. However, their practically achievable specific energy is largely limited by the need for porous conducting matrices as cathode support and the passivation of cathode surface by the insulating Li_2O_2 product. Therefore, a self-standing and hierarchically porous carbon framework embedded with Co nanoparticles is explored, developed by extrusion 3D-printing of cobalt-based metal–organic framework (Co-MOF), followed by appropriate annealing. The novel self-standing framework possesses good conductivity and necessary mechanical stability, so that it can act as a porous conducting matrix. Moreover, the porous framework consists of abundant micrometre-sized pores formed between Co-MOF-derived carbon flakes and meso- and micropores formed within the flakes, which together significantly benefit the efficient deposition of Li_2O_2 particles and facilitate their decomposition due to the confinement of insulating Li_2O_2 within the pores and the presence of Co electrocatalysts. This study provides an effective approach to increase the practical specific energy for Li–O_2 batteries by constructing 3D-printed framework cathodes.

Gwendolyn received her bachelor's degree in Department of Materials and Engineering (MSE) from National University of Singapore. She is currently a PhD candidate in Department of MSE under Prof. Ding Jun, focusing on Additive Manufacturing, particularly extrusion-based 3D printing. Her current research is focused on 3D printing electrodes for energy storage and environmental applications

ALL ARE WELCOME!

Host: A/P Xue Junmin