IBS Center for Multidimensional Carbon Materials

Special Guest Seminar

Prof. Lijie Ci

School of Material Science and Engineering
Shandong University, China

Nanocarbon Composites for Energy Storage Applications

OCT 25
14:00 TUE

Bldg. 101
Seminar Room on the 1st floor

Abstract:
In my talk, I will introduce our recent work on energy storage nanocarbon composite materials. Several structural designs of graphene and nano silicon anode composites were prepared for high energy density lithium ion battery; We also produced double-shell of graphene and artificial solid state electrolytes, such as $Li_7P_3S_{11}$ (LPS), Li_4SiO_4, LiAlO2, encapsulated commercial Si nanoparticles structure for LIB anode with excellent cycling stability and superior rate capability. A simple ball milling method was found to be a suitable method to produce nano-sized $LiMn_2O_4$ and nanocarbon (graphene, carbon nanotubes, or super P) composites for high performance hybrid supercapacitor application. I will also introduce our work using porous nanocarbons as Li host materials for Lithium metal battery application.

Reference:

1. Ai Q., Ci L., et al., Diamond and Related Materials 88, 60 (2018)
2. Chen L., Ci L., et al., Journal of Power Sources 392, 116 (2018)
3. Xu X., Ci L., et al., Electrochimica Acta 276, 325 (2018)
4. Hou G., Ci L., et al., Journal of Power Sources 386,77 (2018)
5. Ma X., Ci L., et al., Journal of Materials Chemistry A 6, 1574 (2018)
6. Ma X., Ci L., et al., Scientific Reports 7, 9642 (2017)
7. Zhai W., Ci L., et al., Nano Research 10, 4274 (2017)
8. Feng J., Ci L., et al., Journal of Power Sources 287, 177 (2015)

Lijie Ci obtained his Ph.D degree in Materials Processing from Tsinghua University in 20 01. After that, Dr. Ci had done scientific research at several institutes: Institute of Physics of CAS in China (2001-2003), Ecole Central Paris in France (2003-2004), Max-Planck Instit ute for Metal Research in Germany (2004-2005), Rensselaer Polytechnic Institute in New York (2005-2007), and Rice University in Houston (2007-2010), TX. He then joined a resea rch management position in the research lab of Samsung Cheil Industries (one of the Sa msung companies) in Bay area, California. After three-year industrial experience, he joine d Shandong University as full professor after he was selected as one of the 9th"The Recr uitment Program of Global Experts" in 2013, one of the top Chinese central government global talent recruitment programs. Dr. Ci has authored and coauthored 185 papers with citations more than 14000 times, and h factor of 50.

You are cordially invited to attend!

IBS Center for Multidimensional Carbon Materials

Special Guest Seminar

Prof. Maoshuai He

College of Chemistry and Molecular Engineering, Qingdao University of Science and Technology, China

Designing Catalysts for Chirality-Selective Synthesis of Single-Walled Carbon Nanotubes

OCT 25
15:10 THU

Bldg. 101
Seminar Room on the 1st floor

Abstract:

How to precisely control the structures of SWNTs during growth is one of the most challenging t asks in carbon nanotube research field. [1].In this contribution, we will first address the SWNT growth thermodynamics, the importance of subsurface carbon and carbon concentration inside catalyst will be highlighted [2]. It is revealed that subsurface carbon is necessary for the nucleation of carbon cap, and the carbon concentration inside catalyst determines the SWNT growth mode, *i.e*. tangential or perpend icular mode [3]. By carefully tune SWNT growth mode, large-diameter SWNTs which tend to collapse spontaneously [4], small-diameter SWNTs with large chiral angles [5] and SWNT intramolecular junct ions with reversible diameter change [6] are achieved. Meanwhile, a general model regarding SWNT g rowth kinetics is proposes and verified by carefully designed experiments.

On the basis of SWNT growth mechanisms, we have designed a number of monometallic and bimetall ic catalysts systems for chiral-selective synthesis of SWNTs [7,8]. The catalysts are either prepared by atomic layer deposition or form solid solution, leading to the formation of uniform catalyst particles up on reduction at low reaction temperature, which ultimately catalyze the growth of mainly near-armchar SWNT species.

Reference:

[1] Adv. Mater., 201800805, 2018.
[2] Nanoscale, 7, 20284-20288, 2015.
[3] Carbon, 113, 231-236, 2017.
[4] ACS Nano, 8, 9657-9663, 2014.
[5] Carbon, 128, 249-256, 2018.
[6] Nanoscale, 10, 6744-6750, 2018.
[7] Chem. Eng. J., 341, 344-350, 2018.
[8] Carbon, 108, 521-528, 2016.

Prof. Maoshuai He received his Ph.D. degree in chemistry from Peking University in 2006. After working as a postdoctoral fellow in Centre National de la Recherche Scientifique (CNRS) in France and Aalto University in Finland, he joined Shandong University of Science and Technology in 2016. In 2018, he moved to Qingdao University of Science and Technology. His research is focused on controlled synthesis and applications of carbon nanomaterials.

You are cordially invited to attend!