MONASH University

Monash Centre for Electron Microscopy

Monash Centre for Electron Microscopy Seminar

Recent Progress on Low-dimensional Boron Nitride Nanomaterials

MONDAY 5 FEBRUARY, 2018

11.00 am

Lecture Theatre S2,
16 Rainforest Walk (Bldg 25)
Monash University Clayton Campus

Presenter

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Abstract

Hexagonal boron nitride (h-BN), a layered material with a regular network of BN hexagons, is a structural sister system of famous graphite. Due to such chemical structural similarity, BN nanomaterials undergo a development history closely entangling with the carbon analogs, from fullerenes via nanotubes to nanosheets. Nevertheless, different from near metallic graphite, BN are highly insulating and wide-bandgap in properties, and more stable than graphite in thermology and chemistry. These make BN be a perfect sidekick of graphite nanomaterials, and enable their bright prospects in high thermal conductivity, strong ultraviolet emission, glorious thermal and chemical inertness, rubout insulation and superb lubrication. However the insufficient production of BN nanomaterials greatly hampered their studies and rather limited the full realization of their exciting nanotechnology potentials. Herein an overview insight into mass-synthesis and diverse applications of BN and its low-dimensional nanostructures is presented, including nanosheets, nanoribbons, nanotubes and nanoparticles developed by us. Recent year's novel methods for realizing the high purity mass production of BN nanotubes and nanosheets will be focused, which fundamentally ensures and promotes the studies and applications based on the large quantities of BN nanomaterials. Some BN nanomaterial filled polymeric composites are additionally discussed, which are expected for the heating-release insulting packaging of down-sizing faster electronic devices.

In addition, in situ mechanical and electrical properties from individual BN nanomaterials have been successfully studied under the TEMs using STM/AFM-TEM special holders.

About the Presenter

Yoshio Bando completed his PhD from Osaka University in 1975 and joined the National Institute for Research in Inorganic Materials (at present National Institute for Materials Science, NIMS) the same year. He has been a Fellow of NIMS and a Chief Operating Officer (COO) of International Center for Materials Nanoarchitectonics (WPI-MANA) until April 2017. He is now a Distinguished Professor at University of Wollongong and also an Executive Advisor of MANA and. He has received a number of awards including the 3rd Thomson Reuters Research Front Award (2012), the 16th Tsukuba Prize (2005), the Academic Awards from Japanese Ceramic Society (1997). He is now an adjunct member of the Science Council of Japan and admitted as Fellows of The American Ceramic Society and The Royal Society of Chemistry. He has been selected as ISI Highly Cited Researchers in Materials Science in 2012, 2014, 2015 2016, and 2017. To date he has authored more than 730 original research papers which have been cited more than 39,000 times at H-factor of 104. His research concentrates on synthesis and property of novel inorganic 1D/2D nanomaterials and their in-situ TEM analysis.

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