

# Seminar

## The 50 year's journey on 1D nanomaterials: discovery of nanothermometer and BN nanotube

 <b>Thursday 13 February, 2020</b>	 <b>Professor Yoshio Bando</b> Australian Institute for Innovative Materials, University of Wollongong National Institute for Materials Science, Japan Institute of Molecular Plus, Tianjin University, China
 <b>11.00am</b>	
 <b>Lecture Theatre S10</b> <b>16 Rainforest Walk, Clayton Campus</b>	

### Abstract

After completing a Ph.D from Osaka University in 1975, I have joined the National Institute for Research in Inorganic Materials (NIRIM) (at present National Institute for Materials Science, NIMS) the same year. Until now, I have been working on the novel synthesis of 1D/2D nanomaterials and their TEM analysis. At an early stage of my career, I have successfully developed three new analytical TEMs in collaboration with JEOL in 1984, 1993 and 2001. By utilizing the new TEM, various new crystal structures have been determined. In the last 50 years, my research highlights are the discoveries of a “nanothermometer” and “boron nitride (BN) nanotubes”.

The nanothermometer was discovered in 2002 by accident in a study of GaN nanotube growth. Carbon nanotubes containing liquid gallium column can be used as a temperature sensor (thermometer). The expansion of the liquid gallium column in the tube covers a temperature change from -200° C to 600° C. This “nanothermometer” has been registered in the Guinness Book as the smallest thermometer in the world.

The finding of BN nanotube by chance in 1996 triggered the fabrication of various inorganic nanotubes, nanowires and nanosheets in my group. For the synthesis of BN nanotubes, I successfully developed the “substitution reaction method” in 1996 and the “carbon free CVD method” in 2002.

Moreover, I developed the “chemical blowing method” for BN nanosheet. By the success of the high purity and the mass synthesis of BN nanotubes and nanosheets, polymeric BN nanocomposites have been fabricated for the first time and opened the door for new applications of insulating heat dissipating substrates.

I wish to thank all my colleges in NIMS for their support of my successful research in the last 50 years.

### The Presenter

**Yoshio Bando** has completed his Ph.D 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 an Executive Advisor of MANA and also a Distinguished Professor both at University of Wollongong, Australia and Tianjin University, China. He has received a number of awards including the “Sacred Treasure” from the Emperor (2017), the 3rd Thomson Reuters Research Front Award (2012), the 16th Tsukuba Prize (2005), the Academic Awards from Japanese Ceramic Society (1997) and others. He is 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 2010, 2012, 2014, 2015 2016, 2017 2018 and 2019. He is also nominated as one of Australia's top 40 research performers in 2019. To date he has authored more than 800 original research papers which have been cited more than 47,700 times at H-factor of 116 (Web of Science). His research concentrates on synthesis and property of novel inorganic 1D/2D nanomaterials for energy and environmental applications and their in-situ TEM study.

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**Convener:** Professor Joanne Etheridge

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