Nano-Carbon Materials: Synthesis and Characterizations

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Synthesis of various nano-carbon materials CNTs and CNHs that we have studied will be reviewed with the emphasis on the large-scale production which is essential for industrialization of the materials [1, 2, and 3]. In this regard there was good news on a CNTs application where CNTs have been utilized for "touch screens of smart phones" last year [4]. Separation of semiconducting single wall carbon nanotubes (SWCNT) and metallic ones from pristine SWCNTs is another important factor for the industrialization. Formation of a large size graphene sheet by thermal CVD method using a metal substrate foil has drawn much attention because of possible industrial applications [5]. One of challenges there will be a low temperature CVD synthesis of thin graphite sheets since it makes their industrialization easier. I shall demonstrate the growth of an A4-size graphite sheets grown at 300℃using a microwave surface-plasma CVD method [6].

In the second half part of this presentation I shall introduce structural characterization of nano-carbon materials using atom-resolution electron microscopes as well as other characterization methods of Raman, photoluminescence and optical absorption spectroscopy, etc. The advantage of high resolution electron microscopy (HRTEM) over other techniques is to be able to characterize local atomic structures such as lattice defects and edge structures of nano-materials and also to observe dynamic behaviors of reaction or transformation processes [7-10]. A recent progress of HRTEM technology such as aberration correction and EELS technology has made possible elemental analysis, distinction of valence and more on individual atom basis.

References

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