EuroSciCon

8th International Conference on

Smart Materials and Structures

August 01-02, 2019
Dublin, Ireland

Mineo Hiramatsu et al., Nano Res Appl 2019, Volume 05

3D graphene network, synthesis, functionalization and applications

Mineo Hiramatsu[1], **Keigo Takeda**[1], **Hiroki Kondo**[2] and **Masaru Hori**[2]

[1]Meijo University, Japan

[2]Nagoya University, Japan

3-dimensional (3D) graphene network with large surface area could be promising material as a platform for electrochemical and bio applications. This kind of carbon nanostructure is called as carbon nanowalls (CNWs), carbon nanoflakes, carbon nanosheets, graphene nanosheets, and graphene nanowalls. CNWs and similar materials are basically self-supported network of few-layer graphenes standing almost vertically on the substrate to form 3D structure. CNWs can be synthesized by plasma-enhanced chemical vapor deposition (PECVD) on heated substrates (600-800˚C) employing methane and hydrogen mixtures. The height of CNWs increases almost linearly with the growth period, while the thickness of each sheet and interspaces between adjacent sheets are almost constant. The maze-like architecture of CNWs with large-surface-area graphene planes would be useful as electrodes for energy storage devices and scaffold for cell culturing. Especially, combined with surface functionalization including surface termination and decoration with nanoparticles and biomolecules, CNWs can be suitable as platform in electrochemical and biosensing applications. We have carried out CNW growth using several PECVD techniques. Moreover, graphene surface was decorated with Pt nanoparticles by the reduction of chloroplatinic acid. We also report the performances of hydrogen peroxide sensor and fuel cell, where CNW electrode was used. Electrochemical experiments demonstrate that CNWs offer great promise for providing a new class of nanostructured electrodes for electrochemical sensing, biosensing and energy conversion applications.

Biography

Mineo Hiramatsu has completed his PhD from Nagoya University and is a Full Professor in the Department of Electrical and Electronic Engineering, Meijo University, Japan. He served as the Director of Research Institute, Meijo University in 2017-2018. His main fields of research are plasma diagnostics and plasma processing for the synthesis of thin films and nanostructured materials. Author of more than 150 scientific papers and patents on plasma processes for materials science. He served as a Chairman and Member of organizing and scientific committees of international conferences on plasma chemistry and plasma processing. He was awarded the Japan Society of Applied Physics Fellow in 2017.

mnhrmt@meijo-u.ac.jp