OMICS Group Conferences
Accelerating Scientific Discovery

2nd International Conference on
Nanotek and Expo

December 3-5, 2012 DoubleTree by Hilton Philadelphia Center City, USA

A simple one step fabrication of highly transparent and flexible superhydrophobic substrate at room temperature

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The transparent and flexible superhydrophobic surface with water contact angle (CA) more than 150° has created a considerable attention to the researchers due to their potential application in upcoming transparent and flexible devices such as optical, optoelectronic and wettability control devices. To date, numerous chemical methods have been developed in order to modify the surface of the transparent and flexible substrates. However, chemical method has several disadvantages. So, to overcome the difficulties of chemical method, there must be a viable technique to fabricate nanostructures onto transparent and flexible substrate without affecting the transparency of the substrate. Very recently, ion irradiation method was used for direct fabrication of conical carbon nanostructures (CNCS) onto transparent Nafion substrate at room temperature without using any chemicals. Interestingly, the transparency of the substrate was maintained as per our desire by controlling the dimension of the substrate (≤400-800 nm) and this kind of CNCS based substrate was effective for field emission performance. In this present work, the hydrophobicity of the conical nanocone structures has been studied. CA of the substrate was found to be higher than 150° with transmittance more than 95%. Antireflective property of this novel nanocone structures onto the surface of Nafion improved the optical transmittance of the Nafion substrate. The superhydrophobicity of the CNCS based Nafion is due to trapping of huge amount of air in between nanocone structures. This one-step chemical free strategy could be extended to other fluorine based polymeric substrates to achieve superhydrophobicity onto transparent and flexible substrate.

Biography

Pradip Ghosh completed his Masters in Chemistry from Burwan University, India in 2002 and Ph.D. from Nagoya Institute of Technology, Japan in 2008. Currently he is working as Japan Society for The Promotion of Science (JSPS) post doctoral fellow at the same institute under the supervision of the Prof. Masaki Tanemura. For the past few years he has been working in the field of carbon nanomaterials and their potential application in various transparent and flexible devices. He has published 23 papers in reputed journals and one book chapter.

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