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ΣΕΜΙΝΑΡΙΟ ΣΕΜΙΝΑΡΙΟ

ΟΜΙΛΗΤΗΣ: **Madeshwaran Sekkarapatti Ramasamy**, Research Associate
Photoelectrochemical Solar Energy Conversion Laboratory
FORTH/ICE-HT

ΘΕΜΑ: **Synthesis and Characterization of Conducting Polymer-Functionalized Graphene Nanocomposites**

ΤΟΠΟΣ: Αίθουσα Σεμιναρίων ΙΤΕ/ΙΕΧΜΗ

ΗΜΕΡΟΜΗΝΙΑ: **Δευτέρα, 10 Νοεμβρίου 2014**

ΩΡΑ: **12:30**

ΠΕΡΙΛΗΨΗ

Graphene is an ideal reinforcing nanocarbon material for high performance polymer composites that exhibits excellent, electrical, mechanical, and thermal properties. Particularly, the combination of graphene with conducting polymers gives rise to novel nanomaterials that can be used for a variety of electrical applications. However, the issues related to the existing state-of-the-art methods still need to be addressed to improve not only the effective dispersion of graphene in the polymer matrix but also the synergetic effect through high interfacial interactions between graphene and polymer. To achieve these goals in the present study, graphene was functionalized with conducting polymers by covalent grafting approach. Particularly, Cu(I) catalyzed Huisgen [3+2] dipolar cycloaddition click chemistry and esterification reaction were used for graphene functionalization. This study was carried out in three parts as follows: First, the processable conducting poly(3-thiophene acetic acid)-graphene nanocomposites were prepared through an esterification reaction. Secondly, self-doped conducting polypyrrole/graphene nanocomposites were synthesized by click chemistry reaction. Thirdly, nanostructured polyaniline was covalently grafted to graphene sheets using click chemistry and rapid mixing polymerization. The findings of the present work show the possibility for the fabrication of high performance conducting polymer/graphene nanocomposites which can be used for various electrical applications.



ΣΥΝΤΟΜΟ ΒΙΟΓΡΑΦΙΚΟ

Dr. M. Sekkarapatti Ramasamy was born in Tamil Nadu, India, 1983. He received his M. Tech. degree in Polymer Science and Engineering from Anna University, India and PhD from Konkuk University, South Korea in 2009 and 2014 respectively. During his doctoral thesis, he has worked on the functionalization of graphene nanosheets with various conducting polymers. His areas of research include functionalization of nanocarbon materials, graphene based polymer nanocomposites and fabrication of graphene based electronic devices. He has published 7 research papers. Currently, he is a postdoctoral researcher in FORTH/ICE-HT working on graphene-based solar cells.

List of Publications

1. Madeshwaran Sekkarapatti Ramasamy, Sibdas Singha Mahapatra, Hye Jin Yoo, Yoong Ahm Kim, Jae Whan Cho, "Soluble conducting polymer-functionalized graphene oxide for air-operable actuator fabrication" *Journal of Materials Chemistry A*, 2, 4788 (2014).
2. Madeshwaran Sekkarapatti Ramasamy, Sibdas Singha Mahapatra, Dong Hun Yi, Hye Jin Yoo, Jae Whan Cho, "Synthesis and electrochemical properties of conducting polyaniline/graphene hybrids by click chemistry" *RSC Advances*, 4, 23936 (2014).
3. Madeshwaran Sekkarapatti Ramasamy, Sibdas Singha Mahapatra, Jae Whan Cho, "Fabrication and characterization of dry conducting polymer actuator by vapor phase polymerization of polypyrrole" *Journal of Nanoscience and Nanotechnology*, 14, 7553 (2014).
4. Sibdas Singha Mahapatra, Madeshwaran Sekkarapatti Ramasamy, Hye Jin Yoo, Jae Whan Cho, "A reactive graphene sheet in-situ functionalized hyperbranched polyurethane for high performance shape memory material" *RSC Advances*, 4, 15146 (2014).
5. Sibdas Singha Mahapatra, Santosh Kumar Yadav, Hye Jin Yoo, Madeshwaran Sekkarapatti Ramasamy, Jae Whan Cho, "Tailored and strong electro-responsive shape memory actuation in carbon nanotubes-reinforced hyperbranched polyurethane composites" *Sensors and Actuators, B*, 193, 384 (2014).
6. Madeshwaran Sekkarapatti Ramasamy, Jin Kyoung Kwon and Jae Whan Cho, "Functionalized multi-walled carbon nanotubes with hyperbranched aromatic polyamide for poly(methyl methacrylate) composites" *Fibers and Polymers*, 14, 182 (2013).
7. Santosh Kumar Yadav, Madeshwaran Sekkarapatti Ramasamy, Jae Whan Cho, "Synthesis of a hybrid assembly composed of titanium dioxide nanoparticles and thin-walled carbon nanotubes using click chemistry" *Journal of Colloid and Interface Science*, 358, 471 (2011).