Graphene-based Nano-materials and Their Applications to Artificial Muscles

***Il-Kwon Oh[1]**

[1]School of Mechanical, Aerospace and Systems Engineering, Division of Ocean Systems Engineering, Korea Advanced Institute of Science and Technology, Daejeon, 305-701, Republic of Korea.

*Corresponding author: ikoh@kaist.ac.kr

The discovery of mono-layered graphene, achieved through an experiment by Geim and Novasolev to synthesize a free standing 2D lattice material, garnered global attention due to its outstanding mechanical, electrical and thermal properties. These properties have been exploited in a wide range of applications including super capacitors, actuators, sensors, reinforcing materials in high performance polymer composites and hydrogels, etc. As another approach, researchers have tried integrating carbon nanotubes with graphene to obtain synergetic effects in applications such as actuators, super-capacitors, mechanically compliant films, fuel cell batteries, solar cells, nano-composites and biomedical devices. Herein we report a simple microwave-based technique to synthesize graphene-based three dimensional nanostructures based on ionic liquid and metal salts as the CNT source. Our proposed method is not only fast, but can also yield high volume production of the functionalized 3D hybrid nanostructures at a fraction of the cost of CVD methods. Present results show that novel 3D nanostrucutres have various potential applications to artificial muscles as well as energy storage systems.

Keywords: Graphene, Nanostructures, Artificial Muscles, Electrochemical Energy Conversion