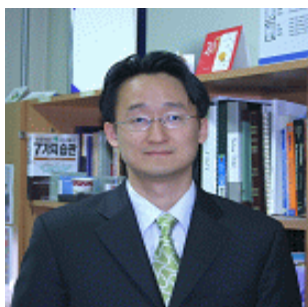


# “Composite, Energy and Environmental Applications of Carbon Nanomaterials”



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**Brief Abstract:** Carbon nanomaterials such as carbon nanotubes and graphene have received considerable attention due to their unique electrical and mechanical properties. This talk provides an overview of our lab's recent research activities in conductive composite, energy and environmental applications of carbon nanomaterials.

Firstly, carbon nanotube-incorporated conductive composites have been of interest for decades. However, the poor contact interface hindered a dramatic increase in electrical conductivity for polymer matrix composites. Here we present highly conductive silver/epoxy pastes [1], metallic inks [2] and stretchable conductive films [3] by using micron-sized silver (Ag) flakes and a small amount of nanotubes functionalized with Ag nanoparticles. The one-dimensional, flexible and conductive nanotubes constructed effective electrical networks among the micron-sized Ag flakes, and the contact interface was improved by the Ag nanoparticles self-assembled on the sidewall of nanotubes. This strategy provided extraordinary high conductivities for epoxy-based pastes and stretchable conductive films.

Secondly, the highly anisotropic thermal property of carbon nanotubes was utilized to control surfacial thermochemical reaction [4] and generate thermopower waves [5]. Finally, membrane filters based on vertically-aligned multi-walled carbon nanotubes with superhydrophobicity and superoleophilicity were investigated to separate oil, water and other molecules [6].

**References:** [1] *J. Mater. Chem.*, 2010, 20, 3579–3582 **Volume:**[2] *J. Mater. Chem.*, 2011, 21, 7070-7073 [3] *Nature Nanotechnology*, 2010, 5, 853-857 [4] *Energy Environ. Sci.*, 2011, 4, 204 [5] *Nature Materials*, 2010, 9, 423-429 **Volume:** [6] *Carbon*, 2010, 48, 2192–2197