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High-performance Nanocomposites for Supercapacitors and Photocatalysts

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Abstract

 \mathbf{D} ue to the increase in the use of unsteady renewable energy, energy storage has been an important issue worldwide. Due to the increase in the environmental pollution, decomposition technique and efficient catalysts are required to solve the problems. Materials based on carbon materials such as graphene, carbon nanotubes, and carbon fibers have been studied for capacitive energy storage. On the other hand, metal oxides or sulfides have been studied as catalysts and photocatalysts. Because their performances are limited, many attempts have been made to enhance their electrochemical properties by combining carbon materials with metal oxides or sulfides for both supercapacitors and catalysts applications. Due to their large surface area and high electrical conductivity, synergistic effects of excellent conductivities of graphene and high electrochemical properties of metal oxides or sulfides have improved the overall electrochemical performances tremendously. These composites show good electrochemical performances especially they are reduced to nano size. In this study, carbonaceous materials such as graphene, carbon nanotubes, carbon nano-onions and various mono-, binary-, and ternary-metal oxides or sulfides have been combined to make nanocomposites. Doping of sulfur or nitrogen has also been investigated to get higher performances.

Biography:

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Jae-Jin Shim received his BS degree from Seoul National University in 1980, MS degree from KAIST in 1982, PhD degree from the University of Texas at Austin in 1990. He has been a professor in Yeungnam University since 1994 and served as School Chairman and Vice-Dean of Engineering. He served as the President of the Korean Society of



CleanTechnology and Vice President of the Korean Society of Engineering Education. He is the Directors of the Institute of Clean Technology and the Clean Energy Priority Research Center. He has published more than 170 papers in reputed journals and served as the Chief Editor of "Clean Technology" and Editor of Korean Journal of Chemical Engineering. His current research interests are synthesis and applications of graphene (or carbon nanotube)-based nanomaterials for supercapacitors, catalysts, and sensors; syntheses of polymers and organic materials using pure water, supercritical fluids, and ionic liquids, and clean technology.

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