

**Amgen Seminar Series in Chemical Engineering**  
in  
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**Carbon Nanomaterials: Next Generation Separation Material for Improved Water Use**

By



**Dr. Reginald Rogers**  
Department of Chemical Engineering  
Rochester Institute of Technology

Water is considered to be the most precious commodity on the planet, and one that needs to be treated with respect. With the ever growing world population, there is an increasing need to develop new materials and systems that can potential improve the quality of water on longer time scales. Newly emerged nanomaterials, such as graphene or carbon nanotubes, are of increasingly widespread importance in environmental remediation, especially in their ability to remove undesirable chemicals from hydrological systems. In this presentation, an in-depth overview of the use of next generation carbon-based nanomaterials for adsorption applications will be discussed. Aqueous-phase adsorption of multiple organic compounds and heavy metal ions at environmentally relevant concentrations by granular activated carbon and graphene-single-walled carbon nanotube free-standing hybrid papers will be presented. Results show that the hybrid nanocomposites have superior adsorption capacities compared to bulk carbonaceous materials with up to 35% and 170% larger uptakes towards aromatic and ionic compounds, respectively. In addition, the use of highly porous, lightweight aerogels as adsorbents of high bonding affinity for a large variety of chemicals provide opportunities for enhanced separation processes. In particular, the nature and the amount of nanostructures (graphene, multi-walled or single-walled carbon nanotubes) along with their dispersion state throughout the carbonaceous matrix strongly influence the adsorption properties of the aerogel. Finally, an outlook on the use of sorted carbon nanotubes for adsorption applications will be shared.

Dr. Reginald E. Rogers is an Assistant Professor in Chemical Engineering at the Rochester Institute of Technology. He is head of the Nanoscale Energy and Separation Materials Laboratory (NESML). Dr. Rogers and his group have been involved in a variety of projects investigating the separation of organic and inorganic compounds from aqueous environments using carbon-based nanomaterials. Dr. Rogers also has projects focused on the development of cathode materials for sodium ion batteries. He has served as a co-author on over 25 research papers and has presented at many national conferences. Dr. Rogers has received several awards and recognition, including the 2015 Joseph N. Cannon Award in Chemical Engineering from the National Organization for the Professional Advancement of Black Chemists and Chemical Engineers, the 2016 Richard and Virginia Eisenhart Provost's Award for Excellence in Teaching from RIT, and very recently named an Emerging Investigator by *Environmental Science: Water Research & Technology*.

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