

EEE Research Seminar

Date: September 26, 2023, at 10:30 AM

Location: POTR 234 (Fu Room)

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Nanotechnologies or Biotechnologies: Which one is better?

Abstract

The World Health Organization estimated that about 11% of the world's population does not have access to clean water and about 1.6 million deaths are caused by contaminated water annually. Even though there are diverse water treatment technologies available today, they are not widely distributed or suitable for all geographic locations and types of water contamination because they have different treatment efficiencies and costs. Furthermore, as our understanding of environmental and health effects of diverse contaminants evolve with advanced analytical technologies, we have been able to identify new emerging contaminants, such as antibiotics, health care products, and others, that cannot be easily treated with the current wastewater and water treatment methods, therefore new approaches need to be developed. In my research group, we have investigated both biotechnologies and nanotechnologies to treat simultaneously diverse types of water contaminants. By using either nanotechnologies and biotechnologies or both approaches together, we were able to gain a better understanding on how they can be used synergistically to improve the removal of diverse contaminants, such as organic matter, metals, and emergent contaminants. In the case of nanotechnologies, we used different photocatalysis and nanoadsorbents that could successfully remove metals and emerging contaminants. Microorganisms, including bacteria, fungi, and algae, are also very promising for biotechnological removal of contaminants by adsorption or biotransformation of pollutants. Ultimately, my research group goal is to combine the complementary benefits of nanotechnology and biotechnology to enhance water treatment to better remove simultaneously diverse contaminants from water.

Bio

Dr. Debora Rodrigues is the Ezekiel Cullen Professor of Environmental Engineering at the University of Houston, TX. She is also the president of the AEESP (Association of Environmental Engineering and Science Professors) organization. She is currently rotating at NSF and serving as NSF program officer for the Partnerships for Innovation (PFI), Mid-Career Advancement (MCA), Future of Work at the Human-Technology Frontier, Engineering Research Center (ERC), Accelerating Research Translation (ART), and Bioinspired programs. She also plays an advisory role at NSF for the ADVANCE program and Open Science Initiative. Her research interests are in the water-energy nexus field. Her unique and transformative interdisciplinary research has led to new alternative biotechnological and nanotechnological water treatment and membrane desalination technologies. As a result of her exceptional contributions to the water field, she was honored with the National Science Foundation (NSF) Career Award in 2012, given to a small number of high-potential junior faculty nationwide. She also received several prestigious awards in her career, just to name a few, she was the recipient of the U.S. Dept. of Energy, the C3E Research Award in the area of water-energy nexus, and the Environmental Award honoree at the 28th HENAAC Conference. Her contributions were noted by the National Academy of Engineers, where she was nominated and invited to participate in the Prestigious Frontiers of Engineering (FOE) program of the National Academy of Engineering (NAE) in U.S. She has more than 100 publications with more than 8733 citations in her field of expertise.