Anaerobic Membrane Bioreactors as a Next-Generation Technology to Address the Food-Energy-Water Nexus

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Abstract: In this talk, we will provide an overview of this recently awarded EPSCoR/Idea Stimulus Research Program project. The project promotes the perspective of municipal wastewaters and, in the long-term, food wastes as resource pools that include potable water, embedded energy, and fertilizers, which is consistent with the emerging concept of the *circular economy*. The anaerobic membrane bioreactor (AnMBR) system is the key to this paradigm shift in treatment approach, serving as the *resource factory* that lies at the center of a broader network of food, energy, and water systems. The objectives of this project are to (i) create innovations in membrane science and AnMBR process configurations to control membrane fouling, increase biogas production, and minimize the energy intensity of wastewater purification; (ii) analyze anaerobic soluble microbial products to assess membrane fouling potential and incorporate these findings into anti-fouling membrane design; and (iii) assess potable water quality and potential for energy and nutrient recovery from waste sludge (i.e., biosolids). *These objectives align very closely with two industry focus areas highlighted in the South Carolina Vision 2025:* (i) energy and (ii) environment and sustainability. Attainment of these objectives will provide a deeper overall understanding of AnMBR technology that is needed to realize its full potential, and will generate key research findings that will strongly support the development of center-type proposal submissions in the arena of the food-energy-water nexus.