



Photothermal Membranes for Energy-Efficient Water Purification

Date : Thursday, September 12, 2019

Time : 1:00 pm – 2:00pm

Location : Engineering A-131

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Environmental, and
Chemical Engineering**

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Abstract:

Global socioeconomic development and increased energy production require unprecedented amounts of fresh water. In response, membrane technologies have been actively pursued for energy-efficient water purification and reclamation. However, membrane fouling remains a vexing problem, and treating highly saline water is still challenging. To tackle this problem, we utilize photothermal effects, and made new photothermal membranes to achieve fouling-resistant and energy-efficient water treatment. This seminar will introduce two new photothermal membranes: Anti-biofouling photothermal ultrafiltration membrane and photothermal membrane distillation (PMD). First, we made anti-biofouling membranes by *in situ* incorporation of graphene oxide (GO) flakes into bacterial nanocellulose (BNC) during its growth. Then the membrane was base-washed, chemically reducing GO to form an (RGO)/BNC membrane. Owing to the high photothermal efficiency of the RGO/BNC membrane, sunlight irradiation can locally increase the membrane temperature and hinder microbial growth and biofilm formation. In the second type of novel membranes, we made a simple, stable, and scalable polydopamine (PDA)-coated polyvinylidene fluoride (PVDF) membrane for highly efficient solar-driven PMD. Using a direct contact membrane distillation (DCMD) system under 0.75 kW/m² solar irradiation, our membrane shows the best energy efficiency among existing photothermal MD membranes (45%) and the highest water flux (0.49 kg/m²·h).

Bio:

Dr. Young-Shin Jun received her BS and MS degrees from Ewha Womans University, holds MS and PhD degrees in Environmental Chemistry from Harvard University, and conducted postdoctoral research at the University of California-Berkeley/Lawrence Berkeley National Laboratory. Dr. Jun received a 2011 U.S. National Science Foundation CAREER award, and was named a 2015 Kavli Fellow by the U.S. National Academy of Sciences, a 2016 Frontier of Engineering Fellow by the U.S. National Academy of Engineering, a 2018 Fellow of the Royal Society of Chemistry, and a 2019 Fellow of the American Chemical Society.