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Membrane and other separation technologies and their application to food technology

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In food industry, separation technology is broadly used to separate, isolate, and purify a particular component from a mixture. These are essential in the food manufacturing process. A numerous separation technologies are available such as using membrane, centrifuge, decanter, spray dryer, freeze dryer, and extractor. Especially, membrane technology has been broadly used in the food industry since 5-6 decades due to their processing at a lower temperature and less energy-intensive. Typically, Microfiltration (MF), Ultrafiltration (UF), Nano-filtration (NF), and Reverse Osmosis (RO) are commonly used pressure-driven membrane separation in the food processing. These types differ in membrane characteristics, pore size, and operating pressure. The major membrane applications in the food are dairy and beverage industries. Microfiltration widely used to remove bacteria and spore, fat, and casein from skim milk. Ultrafiltration is used to remove lactose, and increase or decrease the protein content. Nano-filtration is used to concentrate and partially demineralize liquid products. Reverse osmosis is mainly used to remove water from a mixture which increase the product concentration with dehydration. Despite the many advantages of membrane technology, it has the key disadvantage which is the fouling of the membrane. It causes a reduction in flux rate and thus decreasing productivity over time. Back flux and chemical cleaning process can be applied to minimize the fouling but not perfect. Advanced technology such as grafted coating, zeolite, and graphene can be applied to solve the fouling issues.

Biography

Yongjae Lee is a Head of Separation Science at Food Protein R&D Center at Texas A&M University, USA. In this occupation he directly leads the separation group in the lab and in the pilot plant research on the separation technologies of food, dairy, feed, beverage, specialty ingredients, biotechnology, bio fuel, oil and gas. He also hosts short courses in the area of membrane, and other traditional and advanced separations techniques. He has more than 12 years of industrial experience in the field of microbiology, chemical engineering, and agricultural engineering. He has published several papers in journals and has presented numerous invited lectures in various national and international meeting. He holds a PhD in Animal and Veterinary Science from the Clemson University, Clemson, South Carolina, USA and a master's degree in food science and technology from the Louisiana State University, Baton Rouge, Louisiana, USA.

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