LSU College of Engineering

Chemical Engineering

LECTURE SERIES

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Green Ammonia for Sustainability Across Sectors

Ammonia is the basis of synthetic nitrogen fertilizer production and is thus the backbone of modern agriculture. Its large-scale production using the classic Haber-Bosch process, with hydrogen obtained from fossil fuels, is responsible for 1-2% of both global energy consuption and CO2 emmissions. Reducing the carbon intensity of ammonia production is critical to a more sustainable agricultural system. Furthermore, ammonia's relative ease of storage and transportation (compared to hydrogen), and its potential use as a power/heat generation or transportation fuel with no associated carbon emissions at the point of use, give it considerable promise as a sustainable energy vector, provided it can be produced in a low emissions manner. For these reasons, green ammonia, i.e., ammonia synthesized from hydrogen obtained from water electrolysis and nitrogen obtained from air using renewable electricity, is currently receiving world-wide attention from governments, industry, non-governmental organizations, and private investors. Green ammonia requires more distributed siting and smaller-scale production facilities than traditional ammonia due the inherently localized nature of renewable resources and the relative lack of economies of scale for electrolysis technologies. Optimal design and deployment are critical factors for its economic competitiveness. In this talk, I will describe recent advances and outstanding challenges in the production, deployment, and utilization of green ammonia, highlighting its transformative potential for decarbonization across multiple sectors.

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