Scaling CO_2 Electrolysis: Process Development of an Air-to-Ethylene Pilot Plant

Commercializing CO_2-derived fuels and chemicals requires bridging the gap between laboratory electrolysis cells and fully integrated process systems. This talk presents the process development approach used to scale reactive capture CO_2 electrolysis, centered on the design and operation of an air-to-ethylene pilot plant incorporating direct air capture, a multi-cell electrochemical stack, and ethylene separation.

The presentation will outline the major process blocks, system architecture, and integration strategy connecting CO_2 capture, electrochemical conversion, and downstream handling. Emphasis will be placed on modular plant design, comparisons with our previous CO_2 electrolysis pilot plant, and the role of balance-of-plant subsystems in supporting reliable, continuous operation.

The talk will illustrate how electrochemical CO_2 conversion can be translated into scalable process platforms positioned for future commercial deployment.