**21-5: Electrodeionization Salt Removal from Water**

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**Activity Type:** New Start

**Primary STMD Taxonomy:** TX06.1.2 Water Recovery and Management

**Secondary STMD Taxonomy:** TX06.1.3 Waste Management; TX06.3.5 Food Production, Processing, and Preservation

**Start TRL:** 1 **End TRL:** 3

**Executive Summary:** This project developed a method to selectively extract sodium (Na) from complex, mission-relevant wastewaters using electricity as a driving force. The team investigated capacitive deionization (CDI), which has been used for general desalination but not for selective removal of Na. Three tasks supported this overall aim: designing and building a reactor and electrodes, engineering absorption and desorption parameters, and investigating varying water compositions and sources. Potential benefits of this approach include integrating into existing Environmental Control & Life Support Systems (ECLSS) treatment trains, reducing salinity for hydroponic installations, and producing food preservatives. Significant accomplishments, including building new reactors and characterizing their optimal operations and applications, advance the frontier of in-situ resource utilization for planetary habitation.