

## **Title:** Innovating at Interfaces: Enhancing the Performance and Longevity of Sustainable Energy Systems

### **Abstract:**

Interfaces are ubiquitous, and bottlenecks to performance and longevity in sustainable energy systems often occur due to interfacial interactions. These include both electrochemical reactions (e.g., evolution of methane during CO<sub>2</sub> electroreduction) and physical interactions (e.g., phase change, crystallization, stiction of bubbles), occurring at distinct length-scales and timescales. Deciphering and controlling mechanisms underlying these interactions is critical to designing improved and long-lasting sustainable energy and chemical generation systems. In this talk, interfacial engineering methods to enhance the rate and selectivity of electrocatalytic CO<sub>2</sub> conversion, and control detrimental processes such as corrosion and fouling will be introduced. A special class of ceramics comprising the lanthanide series rare-earth oxides (REOs) will be discussed for their potential in enhancing the longevity of sustainable energy systems by repelling water and scale formation.

Photo:



**Biography:**



Dr. Sami Khan is an Assistant Professor in the School of Sustainable Energy Engineering at Simon Fraser University. He obtained his Ph.D. in Mechanical Engineering from MIT in 2020. At SFU, Dr. Khan leads the Engineered Interfaces for Sustainable Energy (EISEn) group, which aims to improve the performance and longevity of sustainable energy systems by fundamentally understanding and tuning electro-chemo-physical interactions at interfaces, with a particular focus on enhancing CO<sub>2</sub> capture and conversion processes. Dr. Khan is an expert in coatings that reduce fouling, corrosion and hydrogen ingress especially in harsh environments, with a US patent that was recently granted and licensed. He has previously worked in the rare-earth mining industry in Canada and was a Science and Technology Advisor to the Chief Scientist of Natural Resources Canada recently. He is the recipient of many awards including the Action Canada Fellowship (2021) and the Marcel Pourbaix Award for Best Poster in Corrosion Science (received at the NACE international CORROSION conference in 2019).

Email: [s\\_khan@sfu.ca](mailto:s_khan@sfu.ca)

Website: <http://www.khanresearchlab.com>