**Presentation title:** Investigation of the Electrochemical Performance of Transition Metal Oxides in Aqueous Aluminium Ion Batteries.

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**Presentation type:** Oral presentation

**Abstract (250-300 words):**

The notable gravimetric capacity demonstrated by lithium-ion batteries (LIBs) has resulted in their widespread adoption across a spectrum of applications, ranging from portable electronics to electric vehicles and grid storage. However, as concerns continue to mount regarding the rising costs and safety issues associated with LIBs, there has been a burgeoning interest in exploring alternative solutions. This concise review delves into recent advancements with a specific focus on the utilization of transition metal oxides (TMO) for energy storage involving aluminum ions. The principal objective of this investigation is to evaluate the efficacy and potential of these materials in enhancing the overall performance of batteries operating with aluminium ions in an aqueous environment. Employing meticulous methodologies, this study systematically scrutinizes the electrochemical behavior of TMO in aqueous aluminum ion energy storage systems, providing invaluable insights into the intricate nature of their interactions. The key findings of this research illuminate the nuanced electrochemical relationships between transition metal oxides and aluminum ions, contributing to a more profound understanding of the underlying mechanisms governing their performance within the battery system. By advancing our comprehension of the intricate behaviors of transition metal oxides in aqueous aluminum ion batteries, this research makes a substantial contribution to the dynamic landscape of energy storage technologies. Furthermore, these findings hold considerable implications for the future development of more efficient and sustainable systems. As society seeks greener and more cost-effective energy solutions, the knowledge gained from this study contributes significantly to the ongoing efforts to address the challenges associated with current energy storage technologies, paving the way for innovative and environmentally conscious advancements in the field.

**Biography (150-200 words):**

Konica Roy is actively engaged in the field of energy storage systems, with her research centering on the exploration of materials for rechargeable aqueous energy storage systems. Her primary objective is to elevate the performance of aqueous ion energy systems by implementing various strategies, specifically targeting the mitigation of side reactions. This involves a thorough investigation of critical energy storage mechanisms, with a particular emphasis on gel polymer electrolytes. She possesses notable hands-on and computational expertise, showcasing a profound comprehension of solid-state physics. Her specialization during her graduate studies in Condensed Matter Physics further bolsters her understanding of the intricacies within her research domain. Overall, her work aims to advance the efficiency and functionality of rechargeable aqueous energy storage systems through a comprehensive and multi-faceted approach, blending practical and theoretical knowledge. Her prior contributions to biophysical applications, particularly in the development and understanding of bio-inspired growth of bone-like apatite on titanium and titanium dioxide, underscore her versatility and innovative approach.