**Flow Battery Systems: From Electrode Fabrication to Cell Operation and Testing**

Abstract:

This session offers a comprehensive exploration into flow battery systems, a pivotal component in advancing energy storage technologies. Participants will gain hands-on experience and an in-depth understanding of each critical step in developing and operationalizing flow battery systems and learn how to apply this knowledge in real-world scenarios. From the preparation of carbon felt electrodes to the meticulous process of electrolyte formulation and the intricate procedures involved in cell fabrication and operation, every step is designed to equip attendees with the practical skills necessary to contribute to the evolution of energy storage solutions.

Outline:

I. Introduction

 A. Overview of Flow Battery Systems

 - Definition and significance

 - Components and operation

 B. Objectives of the Lab Session

 - Skills and knowledge to be acquired

II. Preparation of Carbon Felt Electrode

 A. Materials and Tools Required

 B. Step-by-Step Fabrication Process

 - Surface treatment

 - Electrode conditioning

 C. Importance in Flow Battery Performance

III. Preparation of Electrolyte

 A. Electrolyte Composition and Variants

 B. Mixing and Safety Procedures

 C. Role in Energy Storage and Conversion

IV. Cell Fabrication and Operation

 A. Assembly of Flow Battery Components

 - Stack assembly

 - Sealing and integrity checks

 B. Operational Parameters Setup

 - Flow rates

 - Temperature controls

 C. Best Practices and Troubleshooting

V. Testing and Performance Evaluation

 A. Testing Equipment and Setup

 B. Key Performance Indicators

 - Energy density

 - Efficiency

 - Cycle life

 C. Data Interpretation and Analysis

VI. Conclusion and Wrap-Up

 A. Recap of Key Learning Points

 B. Discussion on Challenges and Future Directions

 C. Q&A Session

This session promises to be an enriching experience for all participants. It will foster a deeper appreciation and understanding of the intricacies involved in the development and optimization of flow battery systems. By working together and sharing insights, we can all contribute to the evolution of energy storage solutions.