

Chinese Society of Electrochemistry Unveils the Top Ten Scientific Questions in Electrochemistry

USA, March 13, 2024 /EINPresswire.com/ -- [Electrochemistry](#) stands at the confluence of basic and applied sciences, playing a crucial role in energy conversion and storage, material science, environmental protection and biomedical technology, etc. With the global push towards sustainable energy, understanding and overcoming the scientific challenges in electrochemistry is more vital than ever.

In a recent published news (doi:10.61558/2993-074X.3444) from the Journal of Electrochemistry (JECHM), dated January 28, 2024, the Chinese Society of Electrochemistry (CSE) has unveiled the top ten critical scientific questions that are pivotal for the development of electrochemistry. The top ten scientific questions emerged from a nationwide survey initiated by CSE. The survey targeted over 3,000 frontline electrochemical engineers, The survey's objective was to systematically analyze and evaluate key scientific challenges in electrochemistry, including technological bottlenecks in the electrochemical industry. These surveys span across an extensive range of 18 electrochemical research areas, encompassing fundamental electrochemical theories, characterization techniques and methods in electrochemistry, nanomaterials and nanoscience in electrochemistry, lithium-ion batteries, sodium/potassium ion batteries, organic and multivalent metal ion batteries, lithium-sulfur batteries, solid-state batteries, metal-air batteries, supercapacitors, flow batteries, aqueous secondary batteries, fuel cells, electrocatalysis, bioelectroanalysis, solar cells and photoelectrochemistry, as well as organic and industrial electrochemistry, corrosion, and electroplating. This initiative underscores the society's commitment to driving forward the field of electrochemistry by highlighting specific challenges and fostering community-wide engagement for innovative solutions.

The top 10 scientific questions in electrochemistry include□

1. How to Detect or Simulate the Dynamic Structural Changes of Complex Electrochemical Interfaces under In-Situ/Operando Conditions at the Microscale, and Establish Their Relationships with Macroscopic Electrochemical Performance?
2. How to Understand and Regulate the Nucleation and Growth of Metal Lithium at the Anode, and Develop Strategies for Suppressing Dendrite Formation □
3. How to Obtain High-Performance Alkali-Metallon Solid-State Electrolytes for Solid State

Batteries?

4. How to Develop Aqueous Battery Systems with High Energy Density and Multi-Electron Transfer Reaction□
5. How to Rationally Design Efficient and LongLasting Low/Non-Platinum Electrocatalysts and Their Large-Scale Production?
6. How to Construct High-Efficiency Three-Phase Interface and Gain Insights into Enhanced Charge/Mass Transportation Mechanism within a Gas Diffusion Electrode?
7. How to Decipher the Relationships among Human Diseases and Electron Transfer, Energy Conversion/Substance Transformation in Biological Processes? And How to Modulate Them with Electrochemical Methods?
8. How to Break Through the Shockley-Queisser Limit of Energy Conversion Efficiency in Solar Cell?
9. How to Further Reveal the Kinetic Mechanism of Multi-Steps Electrode Reactions for a Complex Corrosion System, and How to Precisely Modulate Anodic and Cathodic Processes, as Well as Their Closely Associated Interfacial Reactions?
10. How to Electrochemically and Precisely Synthesize High Value-Added Organic Chemicals with High Efficiency and High Selectivity?

CSE emphasizes, "Identifying and solving these top ten questions is crucial for the advancement of electrochemistry and its industrial applications, driving innovation in energy storage, conversion, and beyond."

Addressing these questions has the potential to revolutionize how we store and convert energy, paving the way for more efficient batteries, fuel cells, and corrosion-resistant materials an so on. This could lead to significant advancements in renewable energy technologies and a reduction in global carbon emissions.

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