

Past, Present and Future of Electrochemistry

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Developing and deploying renewable energy technologies will require the application of knowledge, concepts, and tools from a variety of fields including chemistry, materials science, physics and, in particular, electrochemistry []. Electrochemistry is, in the broadest sense, the study of relationships between the transformation of electrical energy in chemical bonds and, in the reverse process, the energy stored in chemical bonds back to electrons that can power electrochemical energy storage and conversion systems Central to this presentation will be to introduce - *at atomic and molecular levels* - electrochemical interfaces in aqueous and organic environments and to argue that we are witnessing the renaissance of electrochemistry. Key correlations will be discussed, including structure-function relationships, functional links between covalent and non-covalent interactions, the role of pH values, and key descriptors that control functional links between activity, stability, sensitivity and conductivity of the interface. Fundamental understanding of critical electrochemical processes at interfaces will provide ample opportunities (and challenges) to further improve the current landscape of sustainable energy production and utilization. We will conclude by asking us what we don't know but we would like to know about electrochemical interfaces.

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