

Abstract Submitted  
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**Spectroscopic Analysis of Ion Concentration Profile at Electrode/Electrolyte Interface by Interferometry** DAVID MOORE, RAVI SARAF, Univ of Nebraska - Lincoln — Owing to the difference in Fermi levels at an electrode/electrolyte interface, ions form an electrical double layer (EDL) with ion concentrations well over 10-fold compared to bulk. The concentration profile of the EDL intrinsically affects the electrochemical reaction rates at the electrode, which is of great significance in many applications, such as batteries and biosensors. Conventionally, using cyclic voltammetry (CV) and electrochemical impedance spectroscopy (EIS), the electrical properties of the EDL are represented as “equivalent circuits” consisting of the resistance to charge transfer ( $R_{ct}$ ), the double layer capacitance ( $C_{dl}$ ) and a “Warburg (constant phase) diffusion element” that represents the long range diffusion of ions to the electrode. The translation to the well-understood physical structure can be lost as complicated effects are often lumped together. For example, the effect of subtle modification of the electrode surface by say, redox compounds, enzymes, or polymers is not directly measured, and must be inferred by capacitance changes. An interferometer method will be described to directly measure changes in concentration at the interface during redox process. This method in concert with CV or EIS performed concomitantly will lead to more information to model the diffuse layer for improved understanding of the kinetics of the reaction at different distances from the electrode. Applications to DNA and polymer adsorption binding will be discussed.

David Moore  
Univ of Nebraska - Lincoln

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