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Direct Measurement of Ion Accumulation at Metal-Electrolyte Interface using differential interferometry GAURAV SINGH, RAVI SARAF, University of Nebraska-Lincoln — The ionic charge accumulation at the metal-electrolyte interface is directly measured by using differential interferometry as a function of magnitude and frequency (2-50 kHz) of external electric field. The technique developed probes the ion dynamics confined to the electrical double layer. The amplitude of modulation of the ions is linearly proportional to the amplitude of applied potential. The linearity is observed up to high electrode potentials and salt concentrations. The frequency response of the ion dynamics at the interface is interpreted in terms of the classical RC model. Further extension of the technique to probe Faradaic reactions at the metal-aqueous solution shows higher sensitivity (two orders of magnitude) to the electrochemical reaction compared to the conventional current measurement. Analogous to AC Cyclic Voltammetry, the change in refractive index is observed with the (applied) potential being a DC Ramp on which a small AC signal (probe) is superposed. The widely used Faradaic couple K4Fe(CN)6/K3Fe(CN)6 is used as the model system for the study.

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