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Coupling space charge distribution and cyclic voltammetry measurements

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Abstract:

Space charge distribution measurement methods provide information on electrostatic equilibrium in materials. At the same time, cyclic voltammetry measurements provide chemical information taking place at an electrode/electrolyte interface. The coupling of this two methods is then interesting to obtain on the same sample chemical and electrostatic information. When using elastic waves in space charge measurement methods, such as in Pressure-Wave-Propagation (PWP) method and Pulsed-Electro-Acoustic (PEA) method, space charge measurements and cyclic voltammetry do not operate on the same frequency range. Hence they can be carried out completely simultaneously. In addition, as PWP method does not produce spurious effects at interfaces, it is particularly well suited to interface measurement with a low signal.

In this presentation, coupled space charge distribution and cyclic voltammetry measurements are presented for solid and liquid electrolytes. The oxide formation at the interface is clearly observed, producing a charge buildup at given time in the cycle, as well as the breakdown of the oxide film and dispersion of charges.

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