

Laser-Induced Current Transient Technique

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Abstract

Determination of the potential of maximum entropy (PME), related to the potential of zero charge (PZC), is of importance to understand the mechanism of various electrode processes. In this lab course, laser-induced current transient (LICT) technique is implemented to fulfil the determination of the PME. This technique utilizes the so-called temperature jump effect to heat the electrode surface, resulting a sudden temperature change then to identify the sign of the electrode surface charge.

The PME, useful in the assessment of stiffness of the interfacial water layer, is a potential at which the entropy of the double layer formation reaches its maximum. In the vicinity of PME, species can move through electric double layer (EDL) more easily and reaction should proceed quite fast, whereas the solvent structure is more rigid at potentials more remote from PME. In this case, one can correlate the PME measurements with the activity towards catalytic reactions, e.g. the hydrogen evolution reaction (HER).

In this lab course, you have the opportunity to learn how to perform this LICT technique and understand the activity towards the HER correlation with the PME results.