

The Electrified Cu(111)/Liquid Interface - Laser Induced Current Transients and *In Situ* Scanning Tunneling Microscopy

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Knowledge of the electrified solid/liquid interface is key for a true understanding of electrocatalytic processes. Laser-induced current transient (LICT) measurements allow the investigation of interactions between the electrode and the electrolyte selectively at the interface.[1] The potential of maximum entropy (pme) which is determined via this method is crucial for understanding electrosorption and the actual charge of the metal electrode. In the present work, the pme for a Cu(111) single crystal electrode in different electrolytes has been determined and correlated with the corresponding surface structures through electrochemical scanning tunneling microscopy (EC-STM) investigations. The LICT measurements help to rationalize the carbon monoxide (CO) electro-oxidation on the Cu(111) surface. Although Cu has been of high interest in gas phase CO oxidation,[2] little is known of this reaction in an electrochemical environment. For the first time, we report on the ability of Cu(111) to oxidize CO at low overpotentials in alkaline solution. *In situ* STM coupled with cyclic voltammetry (CV) and subtractively normalized interfacial fourier transform infrared spectroscopy (SNIFTIRS) was used to study the electrochemical behavior of CO on a Cu(111) single crystal. Electrocatalytic processes can alter the electronic, geometric or chemical structure of the active catalyst surface. Therefore, monitoring of electrode surfaces under realistic *in situ* conditions can provide a true atomistic understanding of interfacial structures and electrochemical activity.

[1] V. Climent, B. A. Coles and R. G. Compton, J. Phys. Chem. B 105, 10669 (2001).

[2] G. G. Jernigan and G. A. Somorjai, J. Catal. 147, 567 (1994).