

The Reorganization Energy Dependence of Interfacial
Electron Transfer Rate Constants
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The dependence of electron transfer rate constants at the ZnO-liquid interface on reorganization energy of the acceptor species has been investigated. A series of non-adsorbing, one-electron redox couples with similar, well characterized barrier heights have been synthesized, with reorganization energies spanning 1 eV. NMR line broadening measurements were performed to compliment literature data to establish the magnitude of reorganization energy for the various couples. Differential capacitance vs. potential and current density vs. potential measurements have been used to investigate the interfacial energetic and kinetic behavior of ZnO contacts. We have shown that these ZnO contacts display ideal energetic and kinetic features; the rates of electron transfer were found to be first order in both surface-electron and acceptor concentration. We have found that a 1 eV increase in reorganization energy leads to 10^3 decrease in rate constant. All rate constants can be well characterized in terms of classical Marcus formalism.