

Abstract Submitted
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AFM Study of Charge Transfer Between Metals Due to the Oxygen Redox Couple in Water JEREMY TROMBLEY¹, TESSIE PANTHANI, MOHAN SANKARAN, JOHN ANGUS, KATHLEEN KASH, Case Western Reserve University — The oxygen redox couple in an adsorbed water film can pin the Fermi level at the surfaces of diamond, GaN and ZnO.² We report here preliminary observations of the same phenomenon at metal surfaces. A Pt-coated atomic force microscope (AFM) tip was used to take force-distance measurements on Au, Ag, and Pt surfaces placed in pH-controlled water. The work functions of these surfaces vary over $\sim 2\text{eV}$ and span the electrochemical potential range of the oxygen redox couple, which varies with pH according to the Nernst equation. Adjusting the pH of the water from 4 to 12 allowed us to change the redox potential energy from -5.42eV to -4.95eV , changing the surface charge and the associated screening charge and modulating the pull-off force. This work has relevance to AFM of many materials in air, and to contact electrification, mechanical friction, and nanoscale corona discharges.

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²V. Chakrapani, C. Pendyala, K. Kash, A. B. Anderson, M. K. Sunkara and J. C. Angus, *J. Am. Chem. Soc.* **130** (2008) 12944-12952, and ref. 6 therein.

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