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Switching of the Fe Oxidation State in Ferrocene-Capped Alkanethiols FAN ZHENG, VIRGINIA PÉREZ-DIESTE, J.L. MCCHESNEY, Department of Physics, University of Wisconsin Madison, YAN-YEUNG LUK, Department of Chemistry, Syracuse University, NICHOLAS L. ABBOTT, Department of Chemical and Biological Engineering, University of Wisconsin Madison, F.J. HIMPSEL, Department of Physics, University of Wisconsin Madison — Molecular electronics has been a rapidly-growing area, due to the simplicity of building molecular devices by self-assembly and the promise of extremely low power consumption as a result of pushing the size down to a few molecules per device. A self-assembled monolayer (SAM) of ferrocene-capped alkanethiols is produced in two stable oxidation states of Fe (Fe^{2+} and Fe^{3+}). The oxidation states of Fe are probed with sub-monolayer sensitivity by Near Edge X-ray Absorption Fine Structure (NEXAFS) spectroscopy at the iron $L_{2,3}$ edges ^[1]. NEXAFS provides a direct method to distinguish between the oxidation states of submonolayer by comparing with the bulk sample spectrum. The native Fe^{2+} layer is converted chemically to Fe^{3+} , and the Fe^{3+} layer can be switched back to Fe^{2+} or possibly Fe^0 by irradiation with soft x-rays. The results have implications on switching mechanisms in molecular electronics. [1] Fan Zheng, V. Pérez-Dieste, J. L. McChesney, Yan-Yeung Luk, Nicholas L. Abbott, and F. J. Himpsel, Appl. Phys. Lett, to be submitted.

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