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NEXAFS Spectroscopy of Biomimetic Dyes for Solar Cells PETER COOK, XIAOSONG LIU, FRANZ HIMPSEL, Physics Department, University of Wisconsin Madison — Organic photovoltaics hold the potential for an inexpensive alternative to traditional silicon in solar cell production. A group of such dyes is investigated systematically including porphyrins, phthalocyanines, and cytochrome c, all of them characterized by a transition metal atom surrounded by a cage of four nitrogen atoms. X-ray absorption spectroscopy of the transition metal 2p and the nitrogen 1s absorption edges reveals the LUMO, the oxidation state of the transition metal, and its spin state. In addition, the sensitivity of these molecules to damage by photon-induced hot electrons is investigated. While the nitrogen cage is rather robust, the peptide bonds between the one hundred amino acids in cytochrome c are easily damaged. This finding suggests minimizing the size of biologically-inspired molecules for photovoltaic applications.

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