USING TERAHERTZ SPECTROSCOPY TO STUDY SYSTEMS WITH SOLAR ENERGY APPLICATIONS

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Biomimetic solar water oxidation systems are being developed as renewable alternatives to fossil fuels. One possible design incorporates thin-film dye-sensitized nanoparticle photoanades to capture and convert visible light to charge carriers and catalysts to facilitate water oxidation. The physical properties of the dye are important due to its position as the light absorber and electron transfer initiator. Given the role that porphyrins play in photosynthesis and their synthetic tunability, they are promising components for these photoanodes.

Time-Resolved THz Spectroscopy (TRTS), an optical pump/THz probe technique, is a non-contact electrical probe with proven usefulness for studying electron transfer and conductivity on a sub-picosecond timescale. Using TRTS, the efficiency and dynamics of electron injection from porphyrin dyes into metal oxide surfaces was found to be strongly influenced by the structure and photophysical properties of the dye.