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Research Summary:

- Synthesis and surface modification of colloidal semiconductor nanocrystals
- Study of electron transfer reactions in colloidal semiconductors (photoelectrochemistry) and solar energy conversion into chemical fuels.
- Use of metal oxide nanoparticles (e.g., TiO_2, Fe_2O_3) for light induced metal sequestration, metallic nanocircuit deposition, and disease detection and treatment.

Selected Recent Publications:

A. Musumeci; D. Gosztola; T. Schiller; N. M. Dimitrijevic; V. Mujica; D. Martin; **T. Rajh**. "SERS of Semiconducting Nanoparticles (TiO_2 Hybrid Composites)," *J. Am. Chem. Soc.* **2009**, *131*, 6040.

S. Tepavcevic; S. B. Darling; N. M. Dimitrijevic; **T. Rajh**; S. J. Sibener. "Improved Hybrid Solar Cells via in situ UV Polymerization," *Small* **2009**, *5*, 1776.

D. Cropek; P. A. Kemme; O. V. Makarova; X. L. Chen. **T. Rajh**. "Selective Photocatalytic Decomposition of Nitrobenzene Using Surface Modified TiO_2 Nanoparticles," *J. Phys. Chem. C* **2008**, *112*, 8311.

G. Li; N. M. Dimitrijevic; L. Chen; J. M. Nichols; **T. Rajh**; K. M. Gray. "The Important Role of Tetrahedral Ti^{4+} Sites in the Phase Transformation and Photocatalytic Activity of TiO2 Nanocomposities," *J. Am. Chem. Soc.* **2008**, *16*, 5402.

G. F. Moore; M. Hambourger; M. Gervaldo; O. G. Poluektov; **T. Rajh**; D. Gust; T. A. Moore; A. L. Moore. "A Biospired Construct That Mimics the Proton Coupled Electron

Transfer Between P680(center dot)+ and the Tyr(z)-His190 Pair of Photosystem II," *J. Am. Chem. Soc.* **2008**, *130*, 10466.

D. Zhao; C. Chen; Y. Wang; W. Ma; J. Zhao; **T. Rajh**; L. Zang. "Enhanced Photocatalytic Degradation of Dye Pollutants Under Visible Irradiation on Al(III)-Modified TiO_2: Structure, Interaction, and Interfacial Electron Transfer," *Environ. Sci. Technol.* **2008**, *42*, 308.

Z. V. Saponjic; **T. Rajh**; N. M. Dimitrijevic. "Assembly of TOPO-Capped Silver Nanoparticles to Multilayered Films," *Materials Syntheses. A Practical Guide.* **2008**, Eds: U. Schubert, N. Hüsing, R. Laine. Springer, NY. Pp. 149-154.