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Spin dynamics in coupled core/shell quantum dots[1] J. BEREZOVSKY, M. OUYANG, F. MEIER, D. D. AWSCHALOM, Center for Spintronics and Quantum Computation, University of California, Santa Barbara, CA 93106, D. BATTAGLIA, X. PENG, Department of Chemistry and Biochemistry, University of Arkansas, Fayetteville, AR 72701 — Colloidal nanoparticles provide a flexible system for studying individual quantum-confined electrons and holes. By layering different semiconducting materials in a single nanoparticle, we can create a low bandgap (CdSe) core and surrounding shell, separated by a high bandgap (ZnS) barrier. We have studied spin dynamics in such colloidal heterostructures using two-color time-resolved Faraday rotation (TRFR). By tuning the excitation energy, electron spins can be initialized into different states either in the core or the shell of the nanoparticle. The resulting spin dynamics show a g-factor (spin splitting) that depends on the size of the core or the shell. This g-factor dependence, as well as the spectroscopic dependence of the Faraday effect, allow electron spins in the core or the shell to be addressed independently.

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