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Full band structure calculations of optical spin injection in Si and CdSe JULIEN RIOUX, FRED NASTOS, JOHN E. SIPE, Department of Physics and Institute for Optical Sciences, University of Toronto — We present a theoretical study of optical electron spin injection (optical orientation) in the bulk semiconductors Si and CdSe from direct optical excitation with circularly polarized light.[1] To describe excitation at energies significantly above the band edge, we use full-zone band structures from pseudopotential calculations. For Si, we find that there can be up to 30% spin polarization from direct transitions. The relatively low symmetry of wurtzite CdSe leads to an orientation dependent spin injection, which can be up to 100% polarized at the band edge. Averaging over crystal orientation gives a 50% spin polarization for band edge excitation.

[1]F. Nastos, J. Rioux, M. Strimas-Mackey, B.S. Mendoza, and J.E. Sipe, Phys. Rev. B **76**, 205113 (2007).

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