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Spin-orbit coupling and spin relaxation rate in singly charged pi-conjugated polymer chains JAMES RYBICKI, THO DUC NGUYEN[1], YU-GANG SHENG[2], MARKUS WOHLGENANNT, University of Iowa — In inorganic semiconductor spintronics the spin-diffusion length is usually limited by spin-orbit coupling. Here we examine the effect of spin-orbit coupling in organic spintronics. We consider singly charged pi-conjugated polymer chains. We show that the diagonal matrix elements for spin-orbit coupling are zero. Even the off-diagonal matrix elements are zero or negligibly small unless a twisted, non-planar polymer chain is considered. We calculate these matrix elements as a function of twist-angle using tight-binding wavefunctions. We show that time reversal symmetry prevents spin-orbit induced spin-precession and propose a phonon-assisted spin-flip process.

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