Magneto-optical properties of complex oxides\textsuperscript{1} PENG CHEN, BRIAN HOLINSWORTH, KENNETH O’NEAL, TANEA BRINZARI, JANICE MUSFELDT, University of Tennessee, NARA LEE, LUO XUAN, SANG CHEONG, Rutgers University, NYRISSA ROGADO, ROBERT CAVA, Princeton University, YAQI WANG, BERND LORENZ, University of Houston, STEVE MCGILL, National High Magnetic Field Laboratory — We investigated the magneto-optical properties of $\alpha$-Fe$_2$O$_3$, frustrated system Ni$_3$V$_2$O$_8$, and rare earth indium oxides like DyInO$_3$ in order to understand the interplay between charge and magnetism. We discovered that hematite appears more red in applied magnetic field than in zero field conditions, an effect that is amplified by the presence of the spin flop transition. Furthermore, magnetic field aligns the spins into fully polarized state and induces optical band gap change in Ni$_3$V$_2$O$_8$. As a consequence, Ni$_3$V$_2$O$_8$ appears more green in 35 T. $f$ electron excitations in DyInO$_3$ changes dramatically in applied magnetic field because of enormous spin-orbit coupling effect in the rare earth elements. These findings advance our understanding of spin-charge coupling and motivate spectroscopic work on other functional materials under extreme conditions.

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