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Ultrafast p-d charge-transfer carrier dynamics of multiferroic BiFeO3 Y.M. SHEU, S.A. TRUGMAN, Y.-S. PARK, Center for Integrated Nanotechnologies, LANL, Los Alamos, NM 87545, S.-W. CHEONG, Department of Physics and Astronomy, Rutgers University, NJ 08854, Q. JIA, A.J. TAYLOR, R.P. PRASANKUMAR, Center for Integrated Nanotechnologies, LANL, Los Alamos, NM 87545 — We report first comprehensive understanding of ultrafast carrier dynamics in bulk single crystal $BiFeO_3$. From a wavelength dependent optical pump-probe measurement, we find that the photoexcited carriers relax to the bottom of band through electron-phonon coupling with a $\sim$1 ps time constant that does not significantly change across the antiferromagnetic transition. Following relaxation, carriers leave the conduction band or original excited electronic configuration and decay via radiative recombination, which is supported by our photoluminescence spectroscopy, reported for the first time.

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