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Nonequilibrium Photoresponse of Current-Biased, Epitaxial MgB_2 Microbridges M. KHAFIZOV, D. WANG, X. LI, R. SOBOLEWSKI, University of Rochester, Rochester, NY 14627, Y. CUI, X. X. XI, Pennsylvania State University, University Park, PA 16802 — We report nonequilibrium, subnanosecond-wide voltage transients generated by current-biased MgB_2 microbridges excited by 100-fs optical pulses. Our epitaxial MgB_2 films were grown by the HPCVD technique and the microbridge structures, embedded into coplanar waveguides, were patterned by a conventional photolithography and ion milling. The electrical photoresponse transients, measured in the superconducting state, could be decomposed into two elements: the fast, ∼100-ps-wide, dominating pulse attributed to the kinetic inductive response, and the slow, several-ns-long signal representing the thermal resistive response. The characteristics of the fast response follow the Rothwarf-Taylor model, although in order to explain the peculiar features of this nonequilibrium signal one needs to incorporate into the model the two distinct superconducting gaps. The nonequilibrium photoresponse of MgB_2 microbridges makes them attractive as fast photodetectors.

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