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Ultrafast, Time-Resolved Quasiparticle Dynamics in Hg-Based High Temperature Superconductors X. LI, M. KHAFIZOV, R. SOBOLEWSKI, University of Rochester, Rochester, NY 14627, S. CHROMIK, V. STRBIK, Slovak Academy of Sciences, SK-84104 Bratislava, Slovakia, D. DE BARROS, P. ODIER, CNRS, F-38042 Grenoble, France — We present our all optical and optoelectronic time-domain studies of the quasiparticle and Cooper pair dynamics in Hg-based superconductors. The samples were mixed phase (Hg-1212 and Hg-1223), *c*-axis-oriented thin films, fabricated by magnetron sputtering, followed by *ex-situ* mercuration. The films exhibited the onset of the superconducting transition at T_c = 123 K and the zero-resistance at 110 K. Far below T_c, our femtosecond pump-probe spectroscopy studies clearly demonstrated the bi-molecular-type relaxation of photoexcited quasiparticles, governed by the direct Cooper pair formation process. At temperatures close to T_c, we observed a severe phonon bottleneck, and the quasiparticle relaxation time was limited by the phonon anharmonic decay/escape process. The photoresponse studies performed on current-biased microbridges, illuminated by femtosecond optical pulses demonstrated the picosecond nonequilibrium response on top of the much slower bolometric signal.

Xia Li
University of Rochester, Rochester, NY 14627

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