

## Infrared Photo-response of Fe-shunted Ba-122 Thin Film Microstructures

L. Rehm, D. Henrich, M. Hofherr, S. Wuensch, Member, IEEE, P. Thoma, A. Scheuring, K. Il'in, M. Siegel, S. Haindl, K. Iida, F. Kurth, B. Holzapfel, and L. Schultz

**Abstract** - We present a study of the response to pulsed infrared radiation of Fe-layer shunted pnictide thin film microstructures. The thin film multilayer consisting of 20 nm thick Fe-buffer, 50 nm thick  $\text{Ba}(\text{Fe},\text{Co})_2\text{As}_2$  film and gold protection layer were deposited on heated MgO and  $\text{MgAl}_2\text{O}_4$  substrates by pulsed-laser deposition. The multilayers were patterned into 5 to 8  $\mu\text{m}$  wide and 5  $\mu\text{m}$  long microbridges by electron-beam lithography and ion-milling technique. The microbridges show  $T_c \approx 20$  K and a critical current density up to 2.56 MA/cm<sup>2</sup> at  $T = 10$  K. The photo-response of Fe-shunted  $\text{Ba}(\text{Fe},\text{Co})_2\text{As}_2$  thin film microbridges to infrared radiation was studied in a wide range of incident optical power, operation temperature and bias current. We have found that the electron energy relaxation in studied multilayers is dependent on substrate material and is 1.75 times faster in case of  $\text{MgAl}_2\text{O}_4$  characterized by lattice matching to pnictide film in comparison to MgO substrate.

**Keywords** - barium compounds, high temperature superconductors, infrared detectors, superconducting photodetectors.

IEEE/CSC & ESAS European Superconductivity News Forum (ESNF) No. 22 October/November 2012. ESNF Reference No. ST296 Category 2, 4.

The published version of this preprint appeared in *IEEE Transactions on Applied Superconductivity* 23, 7501105 (June 2013).