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Trapped field property of iron-pnictide bulk magnet

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A trapped field of over 1 T at 5 K and 0.5 T at 20 K has been measured between a stack of magnetized cylinders of bulk polycrystalline $\text{Ba}_{0.6}\text{K}_{0.4}\text{Fe}_2\text{As}_2$ superconductors 10 mm in diameter and 18 mm in combined thickness. The trapped field showed a low magnetic creep rate ($\sim 3\%$ after 24 hours at 5 K), while magneto-optical imaging revealed a trapped field distribution corresponding to uniform macroscopic current loops circulating through the sample. The superconductors were manufactured by hot isostatic pressing of pre-reacted powders using the scalable powder-in-tube technique. A high Vickers hardness of ~ 3.5 GPa and a reasonable fracture toughness of ~ 2.35 MPa $m^{0.5}$ were measured. Given the untextured polycrystalline nature of the cylinders and their large irreversibility field (> 90 T), it is expected that larger bulks could trap fields in excess of 10 T.

1) J. Weiss, A. Yamamoto, A. Polyanskii, R. Richardson, D. Larbalestier, E. Hellstrom, *Supercond. Sci. Technol.* 28, 112001 1-6 (2015).

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