Transport measurements on melt-textured SEG-123 superconductors exhibiting nanostripes

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Transport measurements were performed on melt-textured, ternary light rare earth (LRE)-compounds $(Sm_{0.33}Eu_{0.33}Gd_{0.33})Ba_2Cu_3O_x$ (SEG) exhibiting self-organized nanostripes. The periodicity of these nanostripes ranges between 40 and 60 nm and extends over several tens of micrometers up to millimeters, as revealed by atomic force microscopy at ambient conditions [1]. Electrical contacts were prepared on the polished sample surface by means of electron-beam lithography, enabling the measurement of transport currents oriented parallel and perpendicular to the nanostripe direction. On decreasing the temperature from T_c, the data of the parallel direction deviate in intermediate fields (around 1 T) from the data of the perpendicular direction. At 85 K, there is a clear difference in j_c between the two directions, with $j_c^{parallel} > j_c^{perp}$. Plotting the data in a scaling fashion shows that the peak positions are clearly different with $h_0^{parallel} > h_0^{perp}$, which indicates an increase of the δT_c pinning.

[1] M.R.Koblischka et al., Jpn. J. Appl. Phys. 45, 2259 (2006).