

YBCO Nanowires for Ultrasensitive Magnetic Flux and Photon Detectors

Riccardo Arpaia, Marco Arzeo, Reza Baghdadi, Shahid Nawaz,
Sophie Charpentier, Thilo Bauch, and Floriana Lombardi

Department of Microtechnology and Nanoscience,
Quantum Device Physics Laboratory,
Chalmers University of Technology,
S-41296 Gothenburg, Sweden

E-mail: arpaia@chalmers.se

Abstract — We present our last results on superconducting YBCO nanostructures: the nanowires, fabricated using the improved nanopatterning procedure we have presented in our previous publications, and preserving the superconducting properties close to the as grown films, have been employed in different devices, realized both for fundamental studies and applications. The nanoSQUIDs, realized in the Dayem bridge configuration, and characterized by a record value of the white flux noise, appear extremely promising for applications ranging from studies of nanomagnetism to low field magnetic resonance imaging. The nanorings instead, used for Little Park experiments and characterized by a uniform vorticity of the order parameter, are expected to shed light on different issues on HTS pairing mechanism, especially in the underdoped region. Finally, YBCO/LSMO nanowires, showing high degree of homogeneity, have been fabricated. The presence of the ferromagnetic LSMO layer makes these nanowires ideal candidates both for the investigation of cuprate/manganite-oxide interfaces and for photo-response measurements.