Effect of Ru addition on the superconducting properties of the Eu-123 system

M. Škrátek,[1] A. Cigáň,[1] A. Dvurečenskij,[1] M. Majerová,[1] R. Bystrický,[1] P. Billik,[1] and J. Maňka[1]

[1] *Department of Magnetometry, Institute of Measurement Science Slovak Academy of Sciences, Dúbravská cesta 9, 841 04 Bratislava, Slovakia*

Effects of an Ru addition on the structural and superconducting properties of the Eu-123 system were studied. Samples of $EuBa_2Cu_{3-x}Ru_xO_{7-\delta}$ with x ranging from 0 to 0.7 were prepared by the solid state reaction technique from Eu_2O_3, $BaCO_3$, CuO and RuO_2 precursors at the temperature of 1050 °C for 72 h in flowing oxygen and oxygen-annealed at 580 °C for 24 h. X-ray diffraction data show the presence of another Ba-Eu-Ru-O phase, for $x \geq 0.03$, in addition to the superconducting phase. AC and DC magnetization characteristics were measured by a compensation method using the second-order SQUID gradiometer at ∼77 K and the QD SQUID magnetometer MPMS XL-7 at 20 K. The superconducting properties, T_c, ΔT_c and magnetization $M(H)$, deteriorate with increasing the Ru content; e.g., T_c ranges from 92.6 K to 76 K.