

Interplay of Paramagnetic Signal with the Superconductive Environment of (Nd, Eu, Gd)BaCuO Superconductors

M. Jirsa^a, M. Muralidhar^b, M. Rames^a, and Th. Wolf^c

^aInstitute of Physics, Academy of Sciences of the Czech Republic, Na Slovance 2, CZ-18221 Praha 8, Czech Republic

^bRailway Technical Research Institute, 2-8-38 Hikari-cho, Kokubunji-shi, Tokyo 185-8540, Japan

^cForschungszentrum Karlsruhe GmbH, Institute of Solid State Physics, D-76021 Karlsruhe, Germany

High- T_c superconductors of the 123 type usually exhibit a paramagnetic moment that complicates evaluation of weak superconducting signals, like the thermodynamic reversible magnetic moment. This complication is even worse in the case of melt-textured composites, where Gd-211 particles are commonly used as an effective pinning medium. Such a compound follows Curie-Weiss law above T_c but the paramagnetic behavior departs from this law on superconductivity onset, still modifying the superconducting response in the whole superconductivity range, as tested up to 5 K.

We measured magnetic behavior on both the melt-textured and single-crystalline form of the $(\text{Nd}_{0.33}, \text{Eu}_{0.38}, \text{Gd}_{0.28})\text{Ba}_2\text{Cu}_3\text{O}_y$ superconductor with (in the former case) and without (in the latter case) intentionally added Gd-211 secondary phase and compared it with the magnetic behavior of the single Gd-211 phase. Based on this analysis an attempt to evaluate reversible magnetization of the superconductor and the associated thermodynamic quantities is made.