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Investigation of Gd effect on $YBa_2Cu_3O_{7-\delta}$ superconducting compounds NEVIN SOYLU, OSMAN GORUR, AHMET VARILCI, CABIR TERZIOGLU, Department of Physics, Abant Izzet Baysal University, Bolu, 14280, Turkey — We studied the change of pinning mechanism, electrical, structural, physical, and superconducting properties of $YBa_2Cu_{3-x}Gd_xO7-\delta$ superconductor samples prepared by the conventional solid state reaction method ($x = 0, 0.025, 0.050, 0.100$ and 0.150) by use of dc resistivity, X-ray analysis (XRD),and scanning electron microscopy (SEM). The obtained results demonstrate that $T_{c,offset}$ values of the samples decrease slowly with the increase in the Gd content. The maximum $T_{c,offset}$ (92.0 K) is obtained for the pure sample prepared at 940° C for 20 h in air atmosphere while the minimum value of 83.3 K is found for the sample doped with 0.150 Gd content. Moreover, it is obtained that J_c values reduce from 132 to 34 A/cm^2 with the enhancement of the Gd level in the crystalline structure. The peak intensities belonging to Y123 (major) phase are obtained to decrease whereas the peak intensities of the minor phases such as $BaCuO_2$ and Y211 are found to enhance systematically with the increment in the Gd content in the system, illustrating that partial substitution of Cu^2+ions by Gd^3+ ions are carried out successfully.

Nevin Soylu
Department of Physics, Abant Izzet Baysal University, Bolu, 14280, Turkey

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