QB01

Quasi-two-dimensional superconductivity in wurtzited-structured InN film

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C-axis oriented InN films with wurtzite structure were grown on sapphire (0001) substrate by MOCVD method. Superconductivity with transition onset temperature $T_{c,onset}$ around 3.5 K has been characterized by magnetotransport measurements in fields up to 9 Tesla for films with carrier concentration in the range of 1×10^{19} cm^{-3} to 7×10^{20} cm^{-3}. Among them, the N-face InN film with a nitridation buffer layer has the highest zero-resistance temperature T_{c0} of 2 K. The normal-state magnetoresistance follows Kohler's rule $\Delta R/R \propto (H/R)^2$, indicating that there is a single species of charge carrier with single scattering time at all points on the Fermi surface. The extrapolated value of zero-temperature upper critical field Hc2*ab*(0) and Hc2*c*(0) is estimated to be 5900 G and 2800 G, respectively, giving rise to the G-Lanisotropy parameter γ about 2.1. The angular dependence of the upper critical field is in good agreement with the behavior predicted by Lawrence-Doniach model in the two-dimensional (2D) limit strongly suggestingthat the InN film is a quasi-2D superconductor.

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QB02

Magnetic pinning-effect in $YBa_2Cu_3O_7/Nd_{0.7}Ca_{0.3}MnO_3$ bilayer

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The vortex system of superconductor can be driven by electrical current, which is often coupled with a reliable control of flux quanta movement. Our previous work of $YBa_2Cu_3O_7/Nd_{0.7}Ca_{0.3}MnO_3$ (YBCO/LSMO) system [1] demonstrated a possible way of vortex pinning by the magnetic domain of oxide layer. In this work, the magnetic pinning-effect in $YBa_2Cu_3O_7/Nd_{0.7}Ca_{0.3}MnO_3$ (YBCO/NCMO) bilayers is investigated. It is found that by increasing the field from 0 to 5 Tesla, the critical current density J_c of pure YBCO layer at 50 K is suppressed by three orders of magnitude, from 10^7 to 10^4 A/m^2. However, in the YBCO/NCMO bilayer J_c is less sensitive to the field and maintains at the level of 10^8 A/m^2 at high field. This result indicates that the magnetic pining effect of NCMO is much more efficient than that of LSMO, which maybe related to the difference in the domain structure of these two magnetic films.

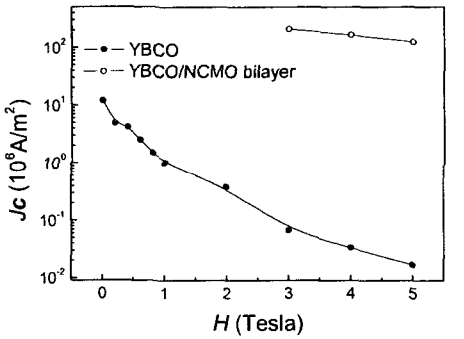

Fig. 1. Critical current density J_c versus magnetic field H for pure YBCO film and YBCO/NCMO bilayer.

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