MAR05-2004-000227

Abstract for an Invited Paper
for the MAR05 Meeting of
the American Physical Society

Superconductivity in Long and Short Molecules

ALEKBER KASUMOV, Laboratoire de Physique des Solides, Universite Paris-Sud, 91405 Orsay, France

We present the results of experimental study of superconductivity in individual molecules of carbon nanotubes [1,2], DNAs [3] and metallofullerenes [4]. Critical currents of supeconductor-molecule-superconductor junctions were extensively studied as a function of temperature and magnetic field. The mechanism of current induced superconductor-normal state transition for a long molecule (carbon nanotubes and DNAs) is the creation of phase slip centers and for a short molecule (metallofullerens) – multiple Andreev reflections. We observe an influence of spin state of encapsulated atom on the induced superconductvity in a metallofullerene molecule.

1. A.Yu.Kasumov, et.al, Science 284, 1508 (1999).

2. A.Yu.Kasumov et al., Phys. Rev. B 68, 214521 (2003).

3. A.Yu.Kasumov et al., Science 291, 280 (2001).

4. A.Yu.Kasumov et al., cond-mat/0402312, submitted to Phys.Rev.Lett.