Anomalous Magnetoresistance Effects in \((\text{CrO}_2)_{1-x} : (\text{MgB}_2)_x\) powders

RAGHAVA PANGULURI, B. NADGORYNY, Department of Physics, Wayne State University, Detroit, MI 48201 — It is known that the electrical conduction mechanism in compressed powders and polycrystalline CrO2 films is due to the intergranular tunneling. Here, we focus on the percolation effects in the CrO2 powders intermixed with a superconductor, MgB2. A mixture of \((\text{CrO}_2)_{1-x} : (\text{MgB}_2)_x\) powders with \(0 \leq x \leq 1\) were cold-pressed to form circular disks. The electrical resistance measured by a four probe technique, as expected showed a lower resistance for the mixture when compared to the pure pressed CrO2. The observed hysteresis extrinsic magnetoresistance (MR) showed peaks corresponding to the coercive fields of CrO2 which can be associated with the alignment of magnetization of adjacent CrO2 particles. Interestingly, the MR changed signs at around the superconducting transition temperature of MgB2 (~40K) and also the slope of MR at high magnetic fields changed from positive to negative. We will discuss a possible origin of the observed effects, which we believe are related to the ferromagnet/superconductor interaction.