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Effect of disorder in neutron irradiated MgB_2 thin films investigated by transport measurements in high magnetic field VALERIA FERRANDO, CNR-INFM-LAMIA, University of Genova, ILARIA PALLECCHI, CNR-INFM-LAMIA, CHIARA TARANTINI, MARINA PUTTI, CNR-INFM-LAMIA, University of Genova, XIAOXING XI, The Pennsylvania State University, CARLO FERDEGHINI, CNR-INFM-LAMIA — We analyse a series of MgB_2 thin films grown by Hybrid Physical Chemical Vapor Deposition (HPCVD), where disorder is introduced by neutron irradiation. Increasing progressively the neutron fluence, T_c monotonously decreases down to 2K and ρ_0 increases by one order of magnitude. A complete characterization of this series of samples is presented. In particular, we propose high field magnetoresistivity and critical field as a method to study the effect of disorder in the two bands. Differently from polycrystalline samples, H_{c2}, after a first increase at the lowest neutrons fluences, only weakly depends on the irradiation level. This suggests that in thin films H_{c2} and resistivity are affected by different mechanisms induced by irradiation. From a quantitative analysis of the magnetoresistivity curves as a function of the angle between the field and the crystalline axes, we extract the scattering times in π- and σ-bands. We find that the unirradiated films have less mobile $\pi-$bands than $\sigma-$ones; upon irradiation, the scattering rates of both bands progressively increase, allowing to estimate resistivity values consistent with the measured ones.

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