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Role of twin boundaries on the vortex dynamics in CSD YBCO nanocomposites[1] V. ROUCO, A. PALAU, M. COLL, R. GUZMAN, J. GAZQUEZ, S. YE, A. LLORDES, J. ARBIOL, S. RICART, X. OBRADORS, T. PUIG, Institut de Ciencia de Materials de Barcelona - CSIC — Vortex pinning landscape engineering is foreseen as the route to high performance YBCO coated conductors at high fields. Solution-derived nanocomposites with randomly oriented nanoparticles were shown to be an excellent low cost option with huge isotropic pinning forces associated to a highly dense defect structure. We find that the local strain ensuing from the partial dislocation associated to intergrowths breaks the vertical coherence of twin boundaries (TB) and reduce the TB spacing. The lack of TB coherence will affect their role as pinning centers or channels for easy vortex flow. Transport measurements at different temperatures and magnetic fields realized in tracks with different crystallographic orientations has enabled to determine the effect of TB in a quantitative manner and establish their contribution (pinning and/or channeling) in a H-T diagram. We show that the anisotropic pinning coming from TBs has a minor role compared with the huge enhancement of isotropic pinning in nanocomposites. On the contrary, we demonstrate that the reduction of the TB vertical coherence has a relevant effect on precluding vortex channelling at low temperatures avoiding a J_c suppression for field parallel to the c-axis.

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