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Strong Pinning and Nonlinear Creep Barriers in Iron-Pnictide Superconductors S. DEMIRDIS, M. KONCZYKOWSKI, C.J. VAN DER BEEK, Laboratoire des Solides Irradies, Ecole Polytechnique, CNRS UMR 7642 & CEA/DSM/IRAMIS, 91128 PALAISEAU, France, R. PROZOROV, Ames Laboratory, Ames, IA 50011, U.S.A., S. KASAHARA, T. SHIBAUCHI, YUJI MATSUDA, Department of Physics, Kyoto University, Kyoto 606-8502, Japan — The irreversible magnetization of Iron-Based Superconductors is characterized by the presence of an ubiquitous peak of the critical current density j_c, centered around zero field. Closer examination shows that the field-dependence of j_c corresponds, in all cases, to a low-field plateau, followed by a power-law decrease, $j_c \propto B^{-\alpha}$ (with $\alpha \sim \frac{5}{8}$) above a cross-over field B^*. This strongly suggests that vortex pinning at low magnetic field is due to strong pinning by nanometer-scale defects. In isovalently doped materials such as $BaFe_2(As_{1-x}P_x)_2$, strong pinning is the only contribution to the critical current. The analysis of j_c allows one to extract, without a priori assumptions, the elementary pinning force and the defect density. In $BaFe_2(As_{1-x}P_x)_2$, the latter quantity is in qualitative agreement with that obtained by H. Shishido *et al.*[Phys. Rev. Lett. **104**, 057008 (2010)]. The temperature dependence of the screening current above B^* is strongly affected by flux creep. The current decays as $j \sim [(k_BT/U)\ln(t+t_0/\tau)]^{-1/\mu}$, with $\mu \sim 1.6$, showing that nonlinear creep barriers are not an exclusive feature of weak collective pinning.

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