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Magnetic Flux Creep Studies in High Temperature Superconductors SCOTT SAWYER, DOMINIQUE DAVENPORT, ROSE ZHANG, CSU Stanislaus — In order to understand the mixed state properties of type II superconductors, high-Tc ceramic superconductors with varying numbers of Cu-O layers were prepared, including La2CuO4+d, YBa2Cu3O7-d, Bi1.7Pb0.3Sr2CaCu2O8-d, and TlBa2Ca3Cu4O11-d. In addition to studying the transition temperatures and Meissner fractions, the magnetic time relaxations were measured, analyzed, and compared. Maintaining superconductivity in the mixed state of type II superconductors relies on the pinning of flux lines within the superconductor. Flux creep occurs when the flux lines overcome the pinning force while the magnetic current density is still less than the critical current density. Unlike conventional superconductors where flux creep is a small effect, the new high Tc superconductors (HTS) have measurable magnetic time relaxations. This is due to the higher thermal energy obtained by the higher temperatures of HTS, and because the energy barrier to flux creep is relatively smaller in HTS. The magnetization of the HTS can be modeled by a logarithmic function of time. This relationship determines the barrier energy to flux creep. Measuring the magnetic time relaxations for various HTS shows how properties such as crystal structure, anisotropy, and inter planar spacing effect the flux pinning of HTS.

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