

Abstract Submitted
for the MAR05 Meeting of
The American Physical Society

Evolution of Depinning Force Density of $Y_{1-x}Pr_xBa_2Cu_3O_{7-\delta}$ Single Crystals with Temperature and Magnetic Fields¹ P. GYAWALI, T. KATUWAL, V. SANDU, C.C. ALMASAN, Kent State University, B.J. TAYLOR, M.B. MAPLE, University of California, San Diego — We measured the zero field cooled magnetic hysteresis of the $Y_{1-x}Pr_xBa_2Cu_3O_{7-\delta}$ single crystals with $x = 0.14, 0.34, 0.47, 0.53$ at various temperatures and magnetic fields. The critical current density J_c was determined using the Bean's critical state model. The magnetic field and temperature dependences of the depinning force density F_{dp} were then calculated. The F_{dp} changes nonmonotonically with magnetic field. Specifically, it increases linearly with H to a peak value and then decreases with further increasing magnetic field. The position of the peak shifts to lower H values with increasing temperature. Also, for all measured H, the value of F_{dp} decreases with increasing temperature. While previous studies have shown that small Pr amounts lead to an increase in the pinning energy of $YBa_2Cu_3O_{7-\delta}$, our results show that a higher concentration of Pr in $YBa_2Cu_3O_{7-\delta}$ decreases the pinning energy.

¹This research was supported by NSF Grant No. DMR-0406471 at KSU and the DOE Grant No. DE-FG03-86ER-45230 at UCSD

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Date submitted: 22 Dec 2004

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