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**Evolution of Depinning Force Density  
of  $Y_{1-x}Pr_xBa_2Cu_3O_{7-\delta}$  Single Crystals with Temperature and  
Magnetic Fields**<sup>1</sup> 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 non-monotonically 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.

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