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Fluorine Doping Effect On $\mathbf{H}_{c2}$ and $\mathbf{R}_h$ In $\mathbf{LaFeAsO}_{1-x}\mathbf{F}_x$ Y. KOHAMA, S. RIGGS, F. BALAKIREV, M. JAIME, Los Alamos National Laboratory, Y. KAMIHARA, T. ATAKE, M. HIRANO, H. HOSONO, Tokyo Institute of Technology — The iron arsenide superconductors discovered earlier this year have attracted much interest, and some families showing high-T_c have been identified. LnFeAsO (Ln; lanthanide) is the first copper-free family of compounds with T_c exceeding 50 K. Here, we present the first systematic study of H_{c2} and R_H in the wide fluorine doping region ($LaFeAsO_{1-x}F_x$; x = 0, 0.25, 0.05, 0.07, 0.11 and 0.14). We found that H_{c2} increases monotonically with decreasing x, while the superconducting phase diagram (T_c, x) displays the classic dome-shaped structure. Furthermore, the shape of $H_{c2}(T)$ depends strongly on x. This, according to Gurevich's model, suggests a multiband electronic structure. The Hall resistivity for non-superconducting samples x = 0, 0.025 show a non-linear magnetic field dependence, which also supports a multiband electronic structure interpretation. In addition, the estimated low-field limit of the R_H for x = 0, 0.025 detect a gap opening at the structural transition and magnetic transition. The evidence for multiband electronic structure links these materials to famous multiband superconductor MgB_2 rather than high-T_c cuprates.

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