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Possible Interface Superconductivity in Rare-earth Doped CaFe2As2 and Undoped CaFe2As2 L. Z. DENG, B. LV[1], K. ZHAO, S. Y. HUYAN, Z. WU, M. GOOCH, B. LORENZ, F. Y. WEI, Y. Y. XUE, C. W. CHU[2], Texas Center for Superconductivity, University of Houston — Interface superconductivity has been proposed as a mechanism that provides continual inspiration and hope as a route to reach HTS/RTS. Difficulties do exist, as most of these proposed materials are artificially designed heterostructure materials and are by nature delicate and easily disturbed by strain and change in the stoichiometry at the interface. The discovery of superconductivity in rare-earth doped CaFe2As2 (Ca122) with Tc up to 49 K [1], brought renewed hope and detailed material studies were systematically carried out on rare-earth (R) doped Ca122 single crystals with R = La, Ce, Pr, and Nd [2,3]. The experimental observations lead us to the conjecture that the Tc enhancement may be related to naturally occurring chemical interfaces associated with defects and thereby provide a new paradigm to find superconductors with higher Tc. Most recently, we discovered interface-induced superconductivity in the undoped Ca122 with a Tc up to ˜25 K [4], which provides the most direct evidence to date for possible interfacial superconductivity in single crystals and also sheds light on the understanding of the superconductivity in rare-earth doped Ca122. References: [1] B. Lv et al, PNAS (2011). [2] F. Y. Wei et al., Philos. Mag. (2014); [3] L. Z. Deng et al., Phys. Rev. B (2016); [4] K. Zhao et al., PNAS (2016).

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