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Observation of the Josephson effect in Pb/$Ba_{1-x}K_xFe_2As_2$ single crystal junctions XIAOHANG ZHANG, RICHARD GREENE, ICHIRO TAKEUCHI, University of Maryland, College Park, YOON SEOK OH, YONG LIU, LIQIN YAN, KEE HOON KIM, Seoul National University — We have fabricated Josephson junctions using single crystals of $Ba_{1-x}K_xFe_2As_2$ and Pb (or PbIn) as the counter electrode in two geometries. The c-plane single crystals of $Ba_{1-x}K_xFe_2As_2$ were synthesized by the Sn-flux method with the nominal composition of $x = 0.4$. In one junction geometry, Ag (30 nm) and PbIn (200 nm) were evaporated on the surface of the crystals. In the other geometry, a Pb point contact was used. Both geometry junctions show resistively shunted junction $I - V$ curves below the T_C of the counter electrode. Microwave induced steps were observed in the $I - V$ curves, and the critical currents are completely suppressible with applied magnetic field in a manner consistent with a small junction limit. $I_C R_N$ products of up to 0.3 mV have been observed in these junctions at 4.2 K. The observation of Josephson coupling along the c-axis between an iron pnictide superconductor and a conventional superconductor suggests the existence of a non-d-wave superconducting order parameter in iron pnictide superconductors.

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