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Enhancement of superconductivity by interfacial phonons in perovskite-clad FeAs monolayer JHINHWAN LEE, SEOKHWAN CHOI, KAIST, WON-JUN JANG, YANNIS SEMERTZIDIS, IBS and KAIST, JONG MOK OK, HYUNJUNG LEE, ALIREZA AKBARI, JUN-SUNG KIM, Postech, ALEX T. LEE, Columbia Univ., KEN NAKATSUKASA, STEVEN JOHNSTON, Univ. of Tennessee, YUNKYU BANG, Chonnam Nat. Univ. — The physics at interfaces between monolayer iron-based superconductors (FeSC) and perovskite substrates has received considerable attention due to the unusually high T_c of ˜100 K found recently in monolayer FeSe on $SrTiO_3$. It has been suggested that forward-scattering interfacial phonons coupled with the Fe-layer electrons can enhance superconductivity from virtually any pre-existing electron-based pairing. Here we report a spectroscopic imaging scanning tunneling microscopy (SI-STM) study on a parent-compound superconductor Sr_2VO_3FeAs, a self-assembled bulk example of FeSC monolayers sandwiched by perovskite layers with substantially high T_c = 33 - 37 K. The quasiparticle interference (QPI) shows clear signatures of forward-scattering phonons with unprecedentedly strong coupling g^2_{ph}/Ω^2_{ph} ˜0.7. Our masked QPI analysis based on the superconducting gap (Δ) and V-Fe hybridization strength (Γ) maps show clear positive correlations between all pairs of Δ, Γ and g_{ph}, which could be the hallmark of pairing enhancement due to interfacial phonons. A self-consistent Migdal-Eliashberg T-matrix QPI simulation reproduces most of the detailed features of the experimental QPI and shows that as much as half of the pairing in this material could be attributable to the electron-phonon coupling.

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