Title:	Large enhancement of superconductivity in Zr point contacts
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Abstract:	For certain complex superconducting systems, the superconducting properties get enhanced under mesoscopic point contacts made of elemental non-superconducting metals. However, understanding of the mechanism through which such contact induced local enhancement of superconductivity happens has been limited due to the complex nature of such compounds. In this paper we present a large enhancement of superconducting transition temperature T c and superconducting energy gap Δ in a simple elemental superconductor Zr. While bulk Zr shows a critical temperature around 0.6 K, superconductivity survives at Ag/Zr and Pt/Zr point contacts up to 3 K with a corresponding five-fold enhancement of Δ. Further, the first-principles calculations on a model system provide useful insights. We show that the enhancement in superconducting properties can be attributed to a modification in the electron-phonon coupling accompanied by an enhancement of the density of states which involves the appearance of a new electron band at the Ag/Zr interfaces.
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