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Polarity-driven surface metallicity in SmB_6 ANDREA DAMASCELLI, Z.-H. ZHU, A. NICOLAOU, G. LEVY, University of British Columbia, Vancouver, Canada, N.P. BUTCH, P. SYERS, X.F. WANG, J. PAGLIONE, University of Maryland, College Park, USA, G.A. SAWATZKY, I.S. ELFIMOV, University of British Columbia, Vancouver, Canada — By a combined angle-resolved photoemission spectroscopy and density functional theory study, we discover that the surface metallicity is polarity driven in SmB_6. Two surface states, not accounted for by the bulk band structure, are reproduced by slab calculations for coexisting B_6 and Sm surface terminations. Our analysis reveals that a metallic surface state stems from an unusual property, generic to the (001) termination of all hexaborides: the presence of boron $2p$ dangling bonds, on a polar surface [1]. The discovery of polarity-driven surface metallicity sheds new light on the 40-year old conundrum of the low temperature residual conductivity of SmB_6, and raises a fundamental question in the field of topological Kondo insulators regarding the interplay between polarity and nontrivial topological properties.

[1] Z.-H. Zhu et al., Phys. Rev. Lett. to appear (arXiv:1309.2945)

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