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Angle-resolved photoemission on the delafossite oxide metal $PtCoO_2$ VERONIKA SUNKO, University of St Andrews, PALLAVI KUSHWAHA, Max Planck Institute for Chemical Physics of Solids, P.J.W. MOLL, Laboratory for Solid State Physics, ETH Zurich, Switzerland, L. BAWDEN, J.M. RILEY, University of St Andrews, NABHANILA NANDI, HELGE ROSNER, M.P. SCHMIDT, F. ARNOLD, E. HASSINGER, Max Planck Institute for Chemical Physics of Solids, T.K. KIM, M. HOESCH, Diamond Light Source , A.P. MACKENZIE, Max Planck Institute for Chemical Physics of Solids, P.D.C. KING, University of St Andrews
— The delafossite structural series of oxides has recently attracted considerable attention because of the remarkable and varied properties of the compounds in the series. Here we consider the Pt-based $5d$ delafossite oxide $PtCoO_2$, the most conductive oxide known [1]. From angle-resolved photoemission and density-functional theory, we show that the underlying Fermi surface is a single cylinder of nearly hexagonal cross-section, with very weak dispersion along k_z. Despite being predominantly composed of d-orbital character, the conduction band is remarkably steep, with an average effective mass of only $1.14m_e$. Moreover, the sharp spectral features observed in photoemission remain well-defined with little additional broadening for over 500 meV below E_F, pointing to suppressed electron-electron scattering. Together, our findings establish $PtCoO_2$ as a model nearly-free electron system and an ideal testbed for elucidating the ultrahigh conductivity in delafossite oxides. [1] Kushwaha P. et al., Sci. Adv. **1**, 9 (2015)

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