# Transport in delafossite microstructures

Philippa McGuinness[1,2], Elina Zhakina[1], Veronika Sunko[1,2], Marcin Konczykowski[3] and Andrew Mackenzie[1,2].

[1] *Max Planck Institute for Chemical Physics of Solids, Nöthnitzer Str. 40, 01187 Dresden, Germany*
[2] *School of Physics and Astronomy, University of St Andrews, KY16 9SS, United Kingdom*
[3] *Laboratoire des Solides Irradiés, Ecole Polytechnique, 91128 Palaiseau, France*

Delafossites are layered oxides with the formula $ABO_2$ where A is Pt, Pd, Au or Cu and B is a transition metal. The Pt and Pd based metallic delafossites are highly conductive in the *ab*-plane, with room temperature resistivities as low as 2.1 μOhmcm and low-temperature mean free paths up to 20 μm [1,2]. Focused ion beam (FIB) microstructuring provides a method to create bespoke devices on these mesoscopic length scales. We are developing FIB-structured $PtCoO_2$ devices designed to probe effects within the ballistic transport regime and measure current inhomogeneities due to the highly anisotropic electronic transport within these materials.

One of the outstanding questions about the delafossites is why they have such low resistivity. A good way to probe this is to study the effects of deliberately inducing scattering centres. We have used 2.5 MeV electron irradiation of FIB microstructures to demonstrate a rapid increase in the *ab*-plane resistivity of $PtCoO_2$ during the creation of additional Pt vacancies. This suggests that the as-grown crystals have an extremely high purity in the Pt layers, with few intrinsic defects, and that this rare structural perfection is at least one of the reasons for their unusual properties.

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[2] C. W. Hicks, A. S. Gibbs, A. P. Mackenzie, H. Takatsu, Y. Maeno, and E. A. Yelland, *Physical Review Letters*, vol. 109, no. 11, p. 116401(1)-116401(5) (2012)