The Dirac Semimetal RuO_2 - From Topology to Functionality

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We will discuss the synthesis, electronic properties, and magnetic structure of thin-film RuO_2, a Dirac semimetal[1] and a leading catalyst for oxygen evolution in electrochemical water splitting.[2,3] While recent claims of altermagnetism[4,5] are currently challenged,[6,7] the debate has rekindled interest in electron correlation phenomena in RuO_2. Angle-resolved photoemission spectroscopy (ARPES) reveals strong Fermi surface nesting, suggesting a propensity for electron correlations. At the RuO_2 (110) surface, these correlations appear to promote a charge density wave instability that can be directly probed via scanning tunneling microscopy (STM).

Keywords: ARPES, STM, RuO_2, Flat Surface State, Altermagnetism, Charge Density Wave.

Acknowledgement: Work supported by the German Research Foundation under Germany's Excellence Strategy through the Würzburg-Dresden Cluster of Excellence on Complexity and Topology in Quantum Matter ct.qmat (EXC 2147, Project 390858490) and through the Collaborative Research Center SFB 1170 ToCoTronics (Project No. 258499086), as well as from the New Zealand Ministry of Business, Innovation and Employment (MBIE, Grant C05X2004)

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