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Challenges and Successes in Translating The Huge Promise of Functional Oxides Into Useful Energy Devices

Opportunities of functional oxides for applications in energy and electronics are huge. However, to date they've not lived up to the promise. In fact, it is a hard task to take an exciting discovery of a material property, to creating a high performance device. However, considering the climate emergency facing us, there is a great need for the scientific community to focus much more on this hard task. The problems stem from both intrinsic and extrinsic materials problem, e.g. composition, defect and interface control. Also, for electronics applications where thin films are needed, current thin film deposition routes mostly cannot deliver the performance of bulk materials. This talk looks at some of the reasons for the aforementioned challenges and shows ways to overcome them. Recent examples from my group are given, highlighting unrivalled device properties across a diverse set of applications, all the way from energy harvesting and storage to non-volatile memory.

Judith Driscoll is Professor in the Materials Science at the University of Cambridge, and is Royal Academy of Engineering Chair in Emerging Technologies. She researches nanostructured oxide thin films for low energy electronics and energy applications. She has wide experience across nearly all the functionalities of oxides and she has a particular focus on engineering oxides to suit particular applications. She has published over 450 papers. She is Fellow of the Royal Academy of Engineering, APS, IOP, IOM3, and MRS.