Highly Confined Electronic and Ionic Conduction in Oxide Heterostructures - DTU Orbit (08/11/2017)

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The conductance confined at the interface of complex oxide heterostructures provides new opportunities to explore nanoelectronic as well as nanoionic devices. In this talk I will present our recent results both on ionic and electronic conductivity at different heterostructures systems. In the first part of my talk I will show some of our resent results that we demonstrated the possibility of stabilizing δ-Bi2O3 using highly coherent interfaces of alternating layers. Remarkably, an exceptionally high chemical stability in reducing conditions and redox cycles at high temperature, usually unattainable for Bi2O3-based materials, is achieved[1]. These confined heterostructures provide a playground not only for new high ionic conductivity phenomena that are sufficiently stable but also uncover a large variety of possible technological perspectives. At the second part, I will discuss and show our recent results of high mobile samples realized by, interface confined redox reactions[2], strain induced polarization[3]and modulation doping at complex oxide interfaces. This collection of samples offers unique opportunities for a wide range of rich world of mesoscopic physics. [1] S. Sanne et al. “Enhancement of the chemical stability in confined δ-Bi2O3”. Nature Materials (2015) doi:10.1038/nmat4266 [2] Y. Z. Chen et al. “A high-mobility two-dimensional electron gas at the spinel/perovskite interface of γ-Al2O3/SrTiO3”. Nature Commun. 4, 1371 (2013) [3] Y. Z. Chen et al. “Creation of High Mobility Two-Dimensional Electron Gases via Strain Induced Polarization at an Otherwise Nonpolar Complex Oxide Interface” Nano Letters. 3774-3778 (2015) 10.1021/nl504622w

General information

State: Published
Organisations: Risø National Laboratory for Sustainable Energy, Department of Energy Conversion and Storage, Electrofunctional materials
Authors: Pryds, N. (Intern)
Number of pages: 1
Pages: 1266
Publication date: 2015
Main Research Area: Technical/natural sciences

Publication information

Journal: Electrochemical Society. Meeting Abstracts (Online)
Volume: MA2015-02
Issue number: 36
ISSN (Print): 2151-2043
Original language: English
Fundamental Studies
Source: FindIt
Source-ID: 276169282
Publication: Research - peer-review › Conference abstract in journal – Annual report year: 2015