第310回応用セラミックス研究所講演会

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Professor, S. N. Bose. National Center for Basic Sciences Kolkata, INDIA 応セラ研客員教授 1月25日(月) 応セラ研R3棟1F会議室にて 10時30分~12時30分

演題:Electronic Structure of Oxides at Interfaces

The experimental advancement in layer-by-layer deposition technique has generated considerable attention in study of oxides at interfaces. In this talk, we will discuss the electronic structure of two such interfaces.

First, we will consider the one formed between a Mott insulator $GdTiO_3$ (GTO) and a band insulator $SrTiO_3$ (STO). [1] We compare our results with those for the widely studied $LaAlO_3/SrTiO_3$ (LAO/STO) interface between two band insulators. GTO/STO was found to behave qualitatively different from that of LAO/STO. The microscopic origin of this difference will be discussed.

In the second example, we will discuss quantum wells formed by embedding the double perovskite Ba_2FeReO_6 (BFRO), in the band insulator $BaTiO_3$ (BTO).[2] we establish that the half-metallicity of bulk BFRO survives down to 1 nm thickness in $BaTiO_3/Ba_2FeReO_6/BaTiO_3$ heterostructures grown along the (001) and (111) directions. The mechanism of confinement driven by the suppressed hybridization between Re/Fe d states, which is distinct from the polar catastrophe, as operative in LAO/STO or GTO/STO, leads to an order of magnitude stronger confinement of the 2D electron gas. We further show low-energy bands of (111) heterostructure display nontrivial topological character.

[1] Hrishit Banerjee, Sumilan Banerjee, Mohit Randeria, Tanusri Saha -Dasgupta, arXiv:1505.00339 (Scientific Report, 2015)

[2] Santu Baidya, Umesh V. Waghmare, Arun Paramekanti, and Tanusri Saha-Dasgupta Phys. Rev. B **92**, 161106(R) (2015)

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