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O.42	**Electron transfer from $LaTiO_3$ to $LaFeO_3$** J.E. Kleibeuker[1,2,*], H. Nishikawa[3], Z. Zhong, A. Müller[2], F. Pfaff[2], H. Boschker[1], M. Sing[2], G. Koster[1], D. H. A. Blank[1], R. Claessen[2], G. Rijnders[1] [1]Inorganic Materials Science, MESA+ Institute for Nanotechnology, University of Twente, P.O. Box 217, 7500 AE Enschede, The Netherlands, [2]Universität Würzburg, Experimentelle Physik 4, Würzburg, Germany, [3]B.O.S.T., Kinki University, Kinokawa, Japan, [4]University of Vienna, Austria

$LaTiO_3$ and $LaFeO_3$ are both antiferromagnetic insulators. However, the arrangement of the Hubbard subbands determines their insulating behavior. $LaTiO_3$ is a Mott-Hubbard insulator; its charge gap (*U*) is determined by the Hubbard splitting of the 3*d* bands of Ti ($U \approx 0.2$ eV). $LaFeO_3$ is a charge transfer insulator; its charge gap (*Δ*) is determined by the filled *p* band of oxygen and the unoccupied upper Hubbard band of Fe ($\Delta \approx 2.2$ eV). [Arima *et al.* PRB, **48,** 17006, *1993*]

In this study, we focus on the charge transfer in $LaTiO_3/LaFeO_3$ heterostructures grown on $SrTiO_3$ (001) by pulsed laser deposition. Since $LaTiO_3$ and $LaFeO_3$ share their oxygen octahedra at the interface, we suggest that the oxygen *p* bands are aligned near the interface. As a result, the empty upper Hubbard band of $LaFeO_3$ becomes lower in energy than the partially filled lower Hubbard band of $LaTiO_3$. Electron transfer from $LaTiO_3$ to $LaFeO_3$ occurs, resulting in the presence of Ti^{4+} and Fe^{2+}. The change in valence state is expected to induce variations in the physical properties.

We have studied the proposed charge transfer using in-situ x-ray photoelectron spectroscopy and will show that the Fe is partially reduced from Fe^{3+} to Fe^{2+}. Furthermore, we will show that the Fe^{2+}/Fe^{3+} ratio strongly depends on the Ti/Fe ratio.

Having the presence of mixed valence Fe, double exchange interactions may be occur, resulting in ferromagnetism. Here, we will discuss the physical properties of $LaTiO_3/LaFeO_3$ heterostructures and clarify the results using DFT calculations.

O.43	**Doped $Ga_{2-x}Fe_xO_3$ ceramics towards magnetoelectric applications** François Roulland, Christophe Lefevre, Alexandre Thomasson, Nathalie Viart DCMI, IPCMS Laboratory, Strasbourg, France, 67034

Magnetoelectric materials are experiencing a renewal of interest in the recent years. This kind of materials can find some applications such as new generation of RAMs. The MeRAMs (Magnetoelectric Random Access Memories), used as data storage applications, can combine the advantages of the magnetic random access memories (MRAMs) in terms of access time and endurance with those of the ferroelectric random access memories (FeRAMs) in terms of writing energy.

$Ga_{2-x}Fe_xO_3$ (GFO) represents a good alternative to the perovskites usually studied for most of the magnetoelectric materials. Bulk GFO is known to be polar, ferrimagnetic above room temperature for $x \geq 1.3$, and magnetoelectric.

The proposed work is firstly to establish a complete study on the GFO elaboration for $Ga_{2-x}Fe_xO_3$ with x from 0.6 to 1.4. The ceramic process has been investigated with respect to milling conditions and calcination parameters to optimise each fabrication step in order to obtain pure and high quality materials. Secondly substitutions of Fe with more voluminous species have been envisaged to generate a cell distorsion which can enhance the ferroelectric behaviour. A first study has been done with scandium.

X-Ray diffraction has evidenced a single phase material until 10% of scandium substituted with an increase of the cell parameters. The different compounds have been observed by SEM coupled with EDX analyses and the wished Sc values were highlighted. The magnetic