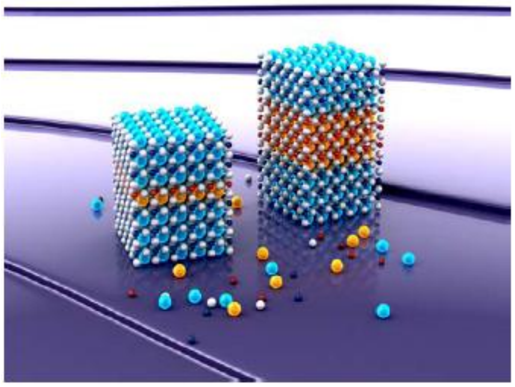
1. Interfacing Oxides (FP7-NMP-2009-LARGE-3, IFOX)



The goal of this proposal is to explore, create and control novel electronic and magnetic functionalities that result from the rich interplay of charge, spin and orbital degrees of freedom in complex **transition metal oxide heterostructures and their interfaces** in order to develop the material platform for novel **beyond CMOS** electronics, which can be integrated into VLSI and with performance and functionality far beyond the state-of-the-art. To this aim we will

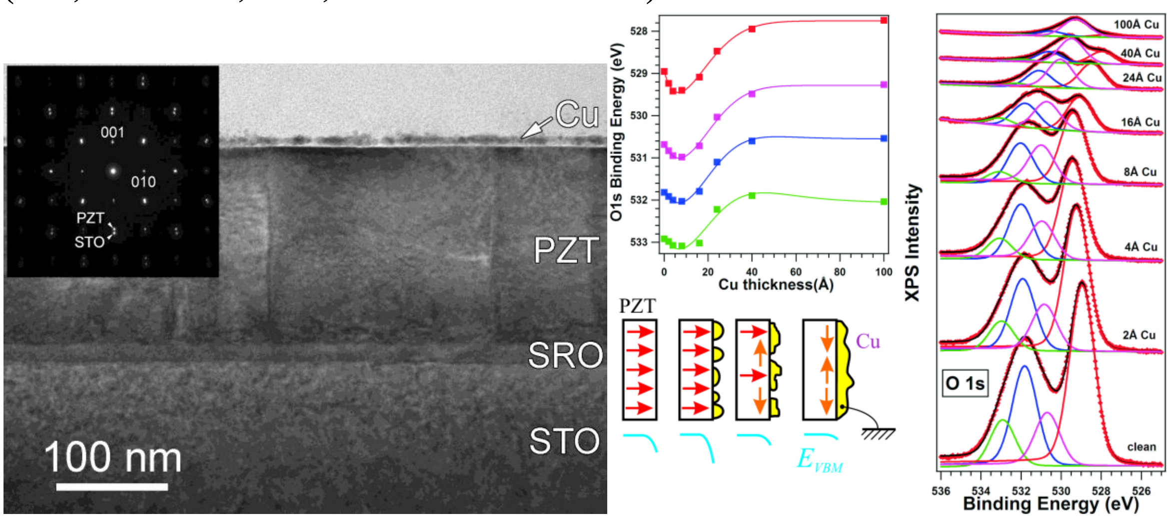
1) establish a theoretical basis to identify the most promising materials/heterostructures and to understand the new functionalities relevant for applications
2) grow oxide films on commercial substrates with a quality comparable to state-of-the-art semiconductor growth
3) establish their patterning and processing conditions within the boundary conditions of current fabrication technologies.
4) characterize their structural, electronic and magnetic properties to deliver concepts for novel (*more than Moore*) devices, in particular in the areas of memories, programmable logic and sensor applications.

Consortium consists of 16 Partners: 3 from the Netherlands (SKU/Radboud Universiteit-coordinator, Universiteit Twente, Twente Solid State Technology B.V.), 5 from Germany (Max Planck Gesellschaft zur Foerderung der Wissenschaften E.V.-MPI Halle, Forschungszentrum Juelich GmbH, Georg August Universitaet Goettingen Stiftung Oeffentlichen rechts, Martin-Luther-Universität Halle Wittenberg, Mainz Universitaet), 3 from Italy (Centro Ricerche Fiat SCPA, Consiglio Nazionale delle Richerche (CNR)-IMNR Bologna, Organic Spintronics srl), 1 from Belgium (Universiteit Antwerpen), 1 from United Kingdom (University of Glasgow), 1 from Ireland (The provost fellows & scholars of the college of the holy and undivided trinity of queen Elizabeth near Dublin), 1 from Switzerland (Paul Scherrer Institut) and 1 from Romania (National Institute of Materials Physics).

2. The Romania team has to produce and characterize epitaxial ferroelectric thin films, with emphasis on the formation of the electrode-ferroelectric interface and its impact on the macroscopic electrical properties of interest for non-volatile memories. Also, NIMP has to produce some novel ferromagnetic materials with high Curie temperature from the class of double perovskites. At the end NIMP has to deliver a report on the feasibility of double color light detector working on dual principle pyroelectric and photovoltaic.

3. The infrastructure for the project: PLD (pulsed laser deposition) working station, with excimer laser at 248 nm; complex system for electric-ferroelectric-photovoltaic investigations (Lake Shore cryoprober for 5-450 K temperatures, TF 2000 ferro-analyzer, HP 4194A Impedance/Gain-Phase Analyzer, Keithley 6517 electrometer, light sources)

4. Human resources: there is a complex team working for this project, composed of 6 experienced researchers, 2 post-docs, 5 Ph. D. students and 2 technicians.
5. Epitaxial layers were obtained and characterized by various techniques (XRD, TEM, electrical measurements). The electrode-ferroelectric interface was also studied using various techniques (XPS, AFM/ PFM, TEM, electrical measurements).



3 papers were published in ISI journals (2 in Journal of Applied Physics and 1 in Journal of the European Ceramics Society), and 1 book chapter (Pintilie L., **Charge Transport in Ferroelectric Thin Films,** "Ferroelectrics: physical effects", editor Mickael Lallart, INTECH, ISBN 978-953-307-453-5, Chapter 5, pp 101-135 (2011), 34).
6. Impact. The NIMP’s participation into this large collaborative project is important for the country. The obtained results are of interest for large companies working in the field of non-volatile memories (eg. INTEL, IBM), or for companies producing or using different types of sensors (Honeywell, FIAT).
7. The NIMP team has established several new collaborations with groups from Finland, Germany, France, Norway.