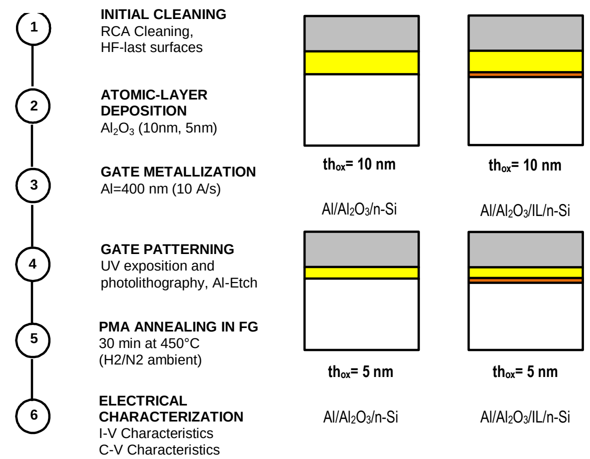

Fig. 1. a) Process flow for fabrication of MIS structures using Al_2O_3 as gate oxide, b) Schematic of the resulting MIS structures having four samples with 5 and 10 nm of physical thickness for Al_2O_3 and also, PMA treatment.

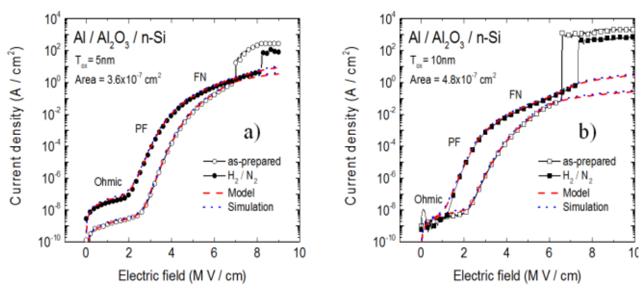

Fig. 3. Comparison between experimental Ig-Vg data, semi-empirical models (using MATLAB for the models already described in the abstract) and CAD simulations (using standard conduction models from SILVACO) for Al_2O_3-based MIS devices with a) th_{ox}=5 nm. and b) th_{ox}=10 nm. For all conditions, an excellent fitting of the simulated and experimental data is observed.

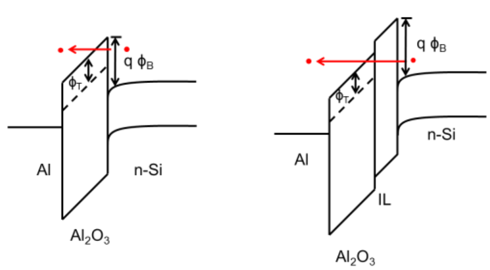

Fig. 5 Ideal energy band diagrams (under substrate injection) for Al_2O_3-based MIS devices in the a) as-prepared and b) annealed condition. For both conditions, Poole-Frenkel and Fowler-Nordheim conduction mechanisms are observed while $\mathbf{\Phi_T}$ and $\mathbf{\Phi_B}$ (associated to each model respectively) are also shown schematically in order to illustrate the large impact of annealing on these parameters and therefore, on carrier conduction.

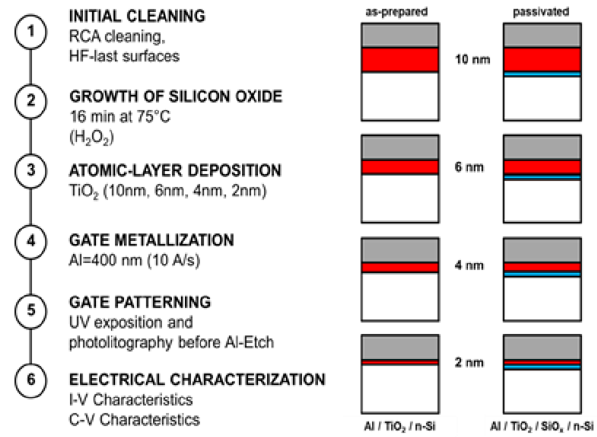

Fig. 2. a) Process flow for fabrication of MIS structures using TiO_2 as gate oxide, b) Schematic of the resulting MIS structures having eight samples with 10, 6, 4 and 2 nm of physical thickness for TiO_2 and also, a passivation treatment using a thin chemical oxide SiOx. It is expected that passivated samples result in less interfacial states.

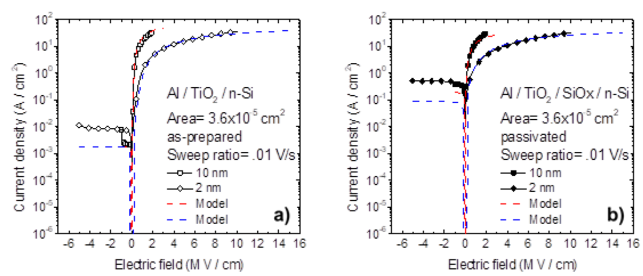

Fig. 4. Comparison between experimental Ig-Vg data, semi-empirical models (using MATLAB for the models already described in the abstract) and CAD simulations (using standard conduction models from SILVACO) for TiO_2-based MIS devices with the following conditions: a) as prepared TiO_2 devices
a
tl

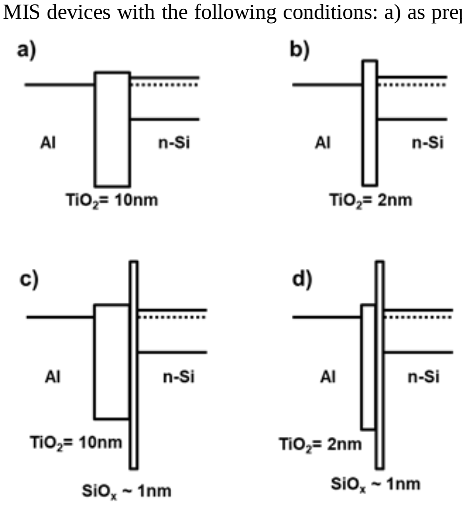

Fig. 6 Ideal energy band diagrams (thermal equilibrium) for TiO_2-based MIS devices in the a) 10 nm as-prepared, b) 2 nm as prepared, c)10 nm passivated and d)2 nm passivated conditions. A widening of the bandgap is observed as the oxide thickness decreases while Schottky emission has been experimentally confirmed for all these structures and where the Schottky barrier $\mathbf{\Phi_{SB}}$, shows a strong dependence with the thickness of TiO_2.