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The effect of oxygen vacancies on the electrical properties of TiO_{2-x} Re-RAM switching devices MAAMAR BENKRAOUDA, UAE University — The main goal of this work is to contribute toward an accurate determination of the electronic properties of Resistance random access memory (Re-RAM) using the density functional theory, which is the current state of the art method that employs high accuracy, it can treat a few hundred atoms on medium sized PC. All the fundamental properties are studied as a function of the mole fraction. The density of states arising from vacancy distribution, the electron transport and formation energy are analyzed. Using controllable mole fraction, various intermediate resistance states are induced. Oxygen vacancy has a considerable effect on the electrical properties of most transition metal oxides such as TiOx Re-RAM devices. The presence of oxygen vacancies is linked to the on-state conduction and resistance switching mechanism. Hydrogen is a ubiquitous impurity in most semiconductors, insertion of hydrogen atoms will remove some of defect states which were induced by oxygen vacancies; this will obviously have an effect on the conductive path, because hydrogen in the vacancy site results in the rupture of conductive channel by localizing electrons, the conductivity may decrease in this case.

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