

4th International Conference on

Condensed Matter and Materials Physics

August 16-17, 2018 | London, UK

Electrical characterization of He-ion irradiated Pd/n-SiGe Schottky diode

Mohammed Mamor¹ and Khalid Bouziane²¹Cadi Ayyad University, Morocco²International University of Rabat, Morocco

There has been considerable interest in integrating high speed and novel devices made from $\text{Si}_{1-x}\text{Ge}_x$ materials, since the alloy is compatible with the silicon based technology. Ion implantation is now a common process in the mature semiconductor industry and is widely used during several electronic devices fabrication steps. In particular, ion implantation is used to improve the fast switches and the performance of photodiodes. Moreover, it is well known that ion implantation into semiconductor materials has a profound influence on the structural and electronics properties of their surface and subsurface region. The ion implantation induces structural and electronic changes, which governs the characteristics of metal contacts formed on the semiconductor. In this presentation, we report on the electronic properties of He-ion irradiation induced defects, as determined by deep level transient spectroscopy (DLTS). In addition, we present the results obtained on temperature-dependent of the Schottky barrier height (SBHs) fabricated on He-ion irradiated n- $\text{Si}_{0.90}\text{Ge}_{0.10}$ and the impact of this irradiation on the conduction mechanism in Pd/n- $\text{Si}_{0.90}\text{Ge}_{0.10}$ Schottky barrier diodes (SBDs). The electrical properties of He-ion irradiated Pd/n- $\text{Si}_{0.9}\text{Ge}_{0.1}$ Schottky diodes were studied in a wide temperature range (100-300 K). It was found that the current flow is controlled mainly by thermionic emission. The Schottky barrier height (Φ_{bn}) and ideality factor (n) of Pd/n- $\text{Si}_{0.9}\text{Ge}_{0.1}$ Schottky diode have been studied as a function of temperature. A decrease of Φ_{bn} and an increase of n with decreasing temperature are observed. Additionally, linear dependence between the so-called temperature factor T_0 and temperature as well the well-known linear correlation between SBHs and ideality factors, $\Phi_{bn}(n)$, are observed and explained in terms of inhomogeneities due to the presence of He-ion irradiation induced defects and traps with associated energy level localized in the gap.

mohammedmamor@yahoo.com