The Open Access Journal of Science and Technology

Abstract

Electrically programmable Memristor in 2D/Magnetic-Based Spin Valve Devices

Zahra Sheykhifard

Department of physics, Shahid Beheshti University, Tehran, Iran

Abstract:

In recent years, the magneto resistance switching memory (MRSM) is used as a keyword for phenomena that comprise the non-volatile and often reversible modification of a device's electrical resistance R, typically initiated by the application of a voltage or current pulse. In a previous study, researchers have successfully integrated spin-valve effect and electrical non-volatile memory to form a novel multifunctional spintronic device, which shows a structure of thin film. But these devices have thus far not been able to simultaneously satisfy the requirements of room temperature operation, large magnetoresistance (MR) value, small magnetic field, and simple structure. Also building a preferable multifunctional memory with considerable MR value at room temperature is a big challenge in others studies. But also our method is an alternative route for bypassing these problems. In this work, we prepared the MoS2-based spin valve structures with lower cost and easier availabilityessential factors for MRSM devices. The MR and the I-V curves characterize the transport properties of the 2D-based spin valves structure, which exhibit both types of non-volatile memory switching, i.e., the magnetoresistance and the memristive switching. This device showing a relative giant magnetoresistance (GMR) of 6% at small magnetic field (400 mT) in the initial state at room temperature. By applying voltage pulses the overall device resistance was decreased while the relative MR increased and showing a unique tunnelling magnetoresistance (TMR) of 1000%. The device resistance could be increased to 10^5 times while the GMR was completely changed to TMR. The results reveal the possibility of integrating 2D materialsinto the future multifunctional molecular-level spintronic device applications.

Biography:

Zahra is PhD candidate in condensed matter physics at Shahid Beheshti University, Iran. At the moment, she is spending her

research study opportunity at department of microelectronic at Delft University of Technology. She has published 5 papers in reputed journals and has 7 papers in national and international conferences. Her research interests include Magnetic and Microelectronics Devices, 2D Materials, Printed Electronics and Wearable Sensors.

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13th International conference on Smart Material and Polymer technology ; February 19-20 2020, Paris, France

Citation: Zahra .ref Electrically programmable Memristor in 2D/Magnetic-Based Spin Valve Devices; Smart Materials 2020; February 19-20 2020, Paris, France