Memory Effect on the Bis(diimino)palladium Nanosheets

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Two-dimensional (2D) material is among the most actively researched field in chemistry and physics in decade. Molecule-based 2D materials offer great diversity because their molecular, ionic, and atomic constituents can be selected and combined to produce a wide variety of nanosheets. The bottom-up approach of synthesizing 2D coordination nanosheets from their corresponding metal ions and organic ligands has proved its potential to form versatile and highly functional materials such as the redox-active, electrochromic, electroconductive, photoconductive, luminescent, photo-electro conversion, and electrocapacitive properties [1]. In this work, we demonstrated the memory effect on the 2D coordination nanosheets based on Bis(diimino)palladium (PdDI). The PdDI nanosheets were prepared by oxidation-promoted coordination reactions at the air-liquid interface. As-prepared sheets were laminated on 300-nm-thick SiO_2/n^+-Si substrates patterned bottom interdigitated electrode of Cr (10 nm)/Au (20 nm) with a channel gap of 5 μm. This two-terminal device can be electrically switched between low and high conductivity states, which is preserved even in the absence of an applied voltage. Its hysteresis loops meet at an applied voltage of 0 V (Fig.1), which means that the resistance of the material depends on the amount of current that has passed through the device. Hence, it provides a simple and low-power way to switch the resistance of a material between two nonvolatile states [2]. This memory effect may derive from the ion replacement and/or movement in this hybrid material.

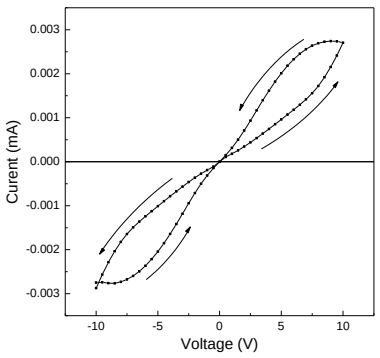

Figure 1: The I-V characteristic of the PdDI-based device.

References:

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