Development of resistive memories based on transition metal doped graphene oxide for neuron simulation

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Resistive memory (ReRAM) can be approximately one hundred times faster than current Flash technologies. This device can still be more economical in power consumption. The key element that makes ReRAM memories so attractive is a component called memristor. This component is based on resistive switching (RS) phenomenon for operation, which is reversible and can be reversed repeatedly. Due to the scalability problem, scientists have also been calling for new materials with advanced properties. Graphene oxide (GO) is a versatile material that can be used in electronic components such as processors and memory chips. In this work, devices fabrication used doped graphene oxide with one percent transition metals (silver, copper or iron). ITO (Indium Tin Oxynitride) and aluminum were used as contacts. Thin films are obtained by the dip coating technique. In hall effect analysis doped graphene oxide thin films showed low mobility. The mechanism of the resistive switching effect in doped graphene oxide thin film based devices has been investigated by macroscopic current-voltage (IxV) measurements. The devices were tested individually; their electrical characteristics and their behavior were verified in case of voltage variations in order to establish the operating limits for set and reset. From the experimental results, a simulation of neural networks was made using data obtained. The neural network model chosen was the so-called perception. This is the simplest form, imitating only a neuron that makes the weighted sum of stimuli in its dendrites and applies an activation function to decide if it is the case of sending or not a signal in its axon, exciting or inhibiting other neurons.