Bioinspired Photomemristive Sensors Based on Graphene and 2D Materials

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Abstract

Two-dimensional (2D) materials, such as graphene and its derivatives [1,2], have recently been actively studied for use in photomemristors [3] for energy-efficient processing of visual information and autonomy pattern recognition [4]. Photomemristive states, controlled by polarization [3], redox processes [5], and photoinduced structural transitions [6], exhibit dynamic behavior necessary to implement in-sensor computation for fast detection [7,8], preprocessing, and storage of visual information [9]. In this work, bioinspired photosensors (Fig. 1) based on 2D materials such as graphene, graphene oxide, MoS2 are considered. It has been shown that 2D materials can be used for intelligent imaging in a wide UV-IR range with preliminary information processing in the sensor itself. Smart detectors with built-in retinal-like neural networks can be made from flexible, biocompatible materials and used in autonomous visual information processing systems.

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References

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Figures

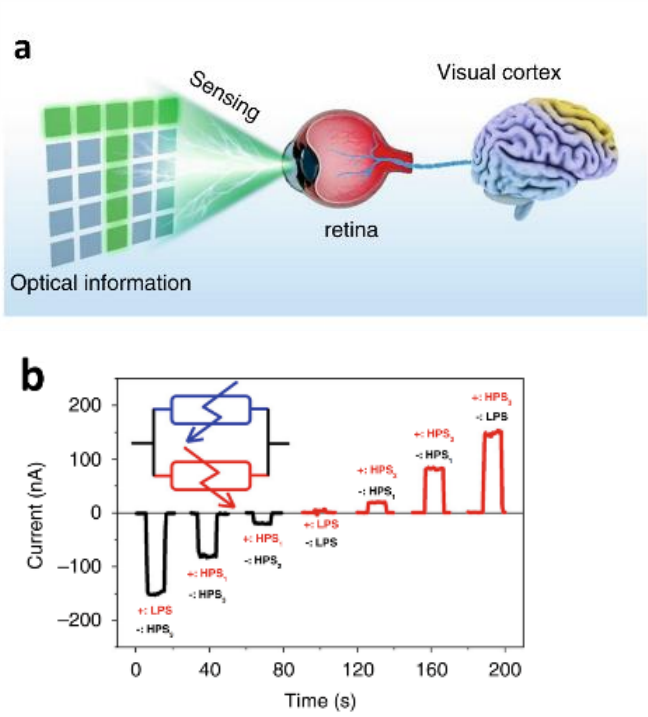

Figure 1. a - Schematic representation of the visual system for perception, memory, and computation. b - Photocurrent for different photoresponse states in different sets of graphene/MoS2-xOx/graphene photomemristors. The inset schematically shows photomemristors installed with opposite polarity.