Transparent Neuromorphic Devices: from Materials to Devices

Darshika Sanjay Khone\* and Abhimanyu Singh Rana

Centre for Advanced Materials & Devices, BML Munjal University, Gurgaon 122413, India

\*Corresponding author: darshikakhone@gmail.com

**Abstract**. Transparent neuromorphic devices are a type of electronic device that mimics the way neurons and synapses work in the human brain. These devices are transparent, meaning that they allow light to pass through them, which makes them suitable for use in applications such as augmented reality displays and smart windows. The fabrication of memristors which is one of the transparent neuromorphic devices involves several steps, including material selection, device design, and fabrication techniques. First, a suitable material must be chosen for the memristor device. Typically, metal oxides are used due to their ability to exhibit memristive behavior, which means their resistance can change based on the history of the current flowing through them. Next, a suitable device design must be chosen. Once the material and device design have been chosen, various fabrication techniques can be employed to create the memristor device.

Highly transparent metal oxide’s thin film and transparent conducting oxide (TCO) were fabricated by growing different amorphous oxide films and indium tin oxide thin film on barium borosilicate glass (7059) substrate, using electron beam evaporation technique. The comprehensive comparison of various deposition parameters has been discussed here to fabricate different thickness of metal oxides thin film for device preparation. Thereafter, the device characteristics were measured using optoelectrical and morphological characterization techniques.