

GaN nanomembranes as memristors with self-rectification

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We have recently shown that GaN ultrathin membranes suspended on GaN nanowires having a thickness of 15 nm and planar dimensions of 12×184 microns are acting as memristive devices [1]. The physical effect which explains this unexpected behavior resides in the migration of the negatively charged deep traps, which are stacked in the membrane volume, towards the unoccupied surface states. We have connected in parallel several GaN memristors and found that these memristor circuits are mimicking simple learning mechanisms such as habituation and dishabituation followed by storage of the electrical response. The learning time depends on the number of memristors connected in parallel and is decreasing with the increase of the number of memristors.

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[1] M. Dragoman, I. Tiginyanu, D. Dragoman, T. Braniste and V. Ciobanu, Memristive GaN ultrathin suspended membrane array, *Nanotechnology* 27 295204 (2016).