Electrical Characterization of Individual Boron Nitride Nanowall Structures

Authors and Affiliations

Center for Nanotechnology and Nanosensors, Department of Microelectronics and Biomedical Engineering, Technical University of Moldova, Chisinau, Republic of Moldova
Vasile Postica, C. Lupan & O. Lupan

Institute for Materials Science, Chair for Functional Nanomaterials, Faculty of Engineering, Kiel, Germany
F. Schütt, H. Krüger, R. Adelung & O. Lupan

Abstract

In this work, the individual hexagonal boron nitride (h-BN) microtubular structures with different diameter (ranging from ≈0.2 to ≈2.5 μm) and a wall thickness below 25 nm were investigated for the first time by integration on SiO2/Si substrate using a method based on focused ion beam deposition (FIB/SEM). The current-voltage (I-V) measurements were carried out in from a bias of −40 V to +40 V and in a temperature range from 25 to 100 °C. All fabricated devices showed excellent insulating properties and the resistance of ≈111 GΩ was calculated, which was attributed mainly to the top SiO2 layer of the substrate measured without h-BN. The obtained results elucidate the excellent potential of the boron nitride microtubular structures with nanowalls to be used as high-quality shielding materials of other nano- and microstructures for application in nanoelectronics, nanophotonics and power electronics, where a relatively wide range of operating temperature is necessary.

Citation

Postica, V., Schütt, F., Lupan, C., Krüger, H., Adelung, R., Lupan, O. (2022). Electrical Characterization of Individual Boron Nitride Nanowall Structures. In: Tiginyanu, I., Sontea, V., Railean, S. (eds) 5th International Conference on Nanotechnologies and Biomedical Engineering. ICNBME 2021. IFMBE Proceedings, vol 87. Springer, Cham. https://doi.org/10.1007/978-3-030-92328-0_3