https://doi.org/10.33263/Proceedings11.00620063

ISSN: 2668-6384 https://conferenceproceedings.international

Proceedings International

Volume 1, Issue 1, Pages 0062-0063
2019

Received: 01.10.2019
Accepted: 10.10.2019
Published: 15.10.2019

Proceedings, Abstract

Microscopy studies on magnetron sputtered thin films with preferred orientation for positron moderation

V.L. Ene [1, 2], A.B. Șerban [2], V. Leca [2], B.S. Vasile [1], E. Andronescu [1, 2, *]

[1] University Politehnica of Bucharest, Faculty of Applied Chemistry and Materials Science, Gh. Polizu Street No. 1-7, Bucharest, Romania
[2] Extreme Light Infrastructure - Nuclear Physics (ELI-NP), Horia Hulubei National R&D Institute for Physics and Nuclear Engineering, Reactorului Street No. 30, Magurele, Romania
* Correspondence: ecaterina.andronescu@upb.ro; Scopus ID: 57194217630

Doppler-broadening Spectroscopy (DBS) and positron annihilation lifetime spectroscopy (PALS) are two positron annihilation spectroscopy techniques used for identifying near surface vacancies and lattice dislocations. Positrons manifest a broad energy distribution of about several MeV and in order to generate a low-energy positron beam, the positrons need to pass through a material called "moderator" so that a narrow positron kinetic energy bandwidth can be obtained, without losing too much intensity. The moderator must possess certain properties, among which a large negative positron work function and a large branching ratio to free positrons. The first can be assessed to an intrinsic characteristic of the material, that is usually correlated to the material bandgap, and in order to attain the second, a defect free, epitaxial thin film should be obtained.

Due to its 3.4 eV bandgap, GaN represents a very promising candidate for positron moderation and field assisted moderation, that might manage longer average positron diffusion lengths. The aim of the present study is to obtain semi-insulating GaN thin films by magnetron sputtering GaN on different substrates (ZnO, TiO_2, Al_2O_3) with fewer impurities incorporated, which should hold promises of increasing the positron diffusion length in the material.

Preliminary depositions made in this study are to be discussed, highlighting both their advantages and limitations derived from their structure characterization.

Keywords: *Doppler-broadening spectroscopy, DBS, magnetron sputtered thin films.*

Funding

Not applicable.

Acknowledgments

Not applicable.

Conflicts of Interest

The authors declare no conflict of interest.

Cite This Work: Ene, V.L.; Șerban, A.B.; Leca, V.; Vasile, B.S.; Andronescu, E. Microscopy studies on magnetron sputtered thin films with preferred orientation for positron moderation. Proceedings Int **2019**, 1, 0062-0063. https://doi.org/10.33263/Proceedings11.00620063

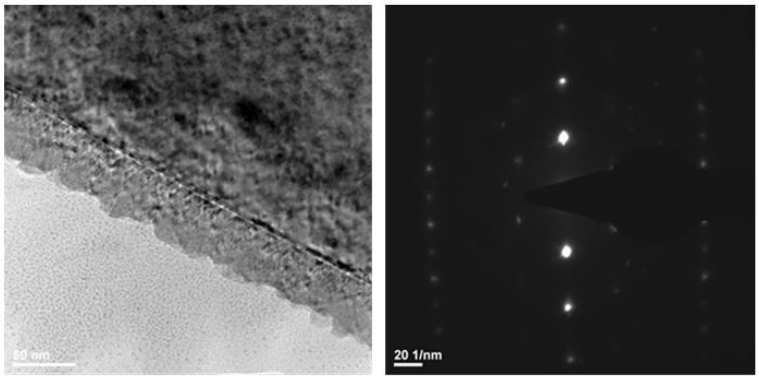

Figure 1. TEM and SAED images on the GaN – ZnO interface.

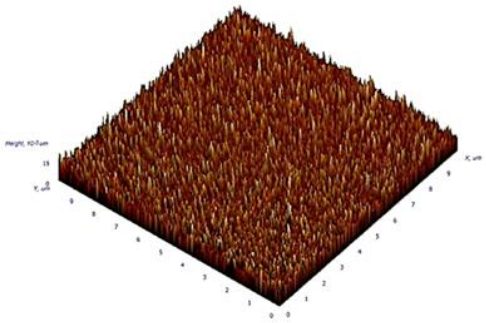

Figure 2. Atomic force microscopy on the GaN deposited on ZnO.

References

1. Hugenschmidt, C. Positrons in surface physics. *Surf. Sci. Rep.* **2016**, *71*, 547–594, https://doi.org/10.1016/j.surfrep.2016.09.002.
2. Beling, C.D.; Fung, S.; Ming, L.; Gong, M.; Panda, B.K. A theoretical search for possible high efficiency semiconductor based field assisted positron moderators. *Appl. Surf. Sci.* **1999**, *149*, 253–259, https://doi.org/10.1016/S0169-4332(99)00211-1.
3. Kuech, T.F. III-V compound semiconductors: Growth and structures. *Prog. Cryst. Growth Charact. Mater.* **2016**, *62*, 352–370, https://doi.org/10.1016/j.pcrysgrow.2016.04.019.