

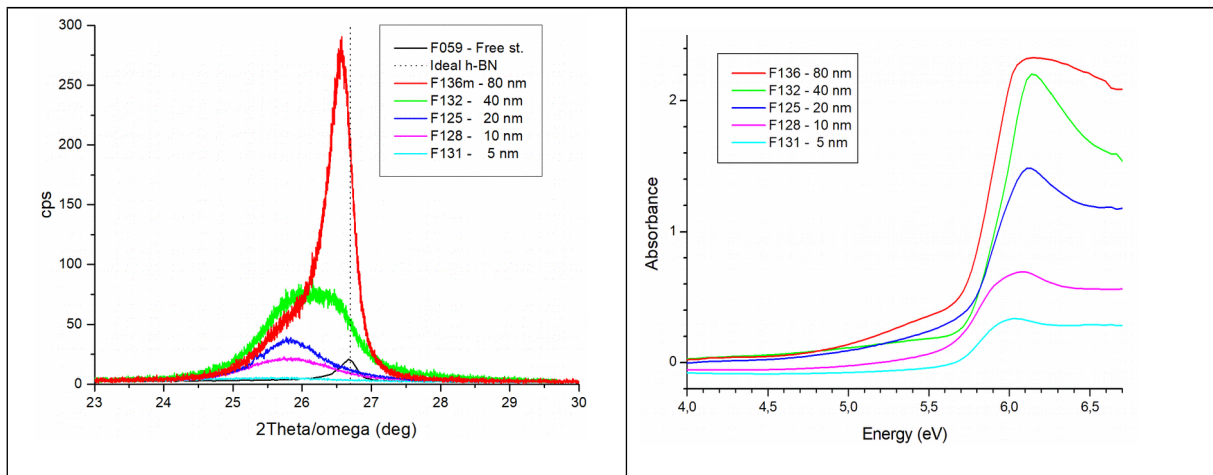
Properties of MOVPE boron nitride layers

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Boron nitride was grown on sapphire substrates by metalorganic vapor phase epitaxy (MOVPE) with triethylboron and ammonia as B and N precursors. Continuous [1] and pulsed growth methods [2] were investigated. Growth was performed by covering a wide range of thermodynamic parameters to establish their influence on the synthesis efficiency and epilayer properties.

The obtained BN layers were characterized using several methods: X-ray diffraction, Raman spectroscopy and a variety of microscopic techniques such as scanning electron microscopy, transmission electron microscopy and atomic force microscopy. These investigations provided thorough information about the crystallographic lattice properties including subsequent layer alignment, as well as bonding type, structural defects and built-in strain in the grown material. Optical methods including absorption and photoluminescence provided information about band structure and optically active defects in the boron nitride layers.



The quality of the monocrystalline h-BN layers, presented at this work, is similar to best material reported recently in literature [3,4]. Our material displayed a good crystallographic structure and orientation correlated with the sapphire substrate.

The performed technological experiments substantially broadened our understanding of the growth thermodynamics of BN layers. Our findings allow us to implement new methods aiming at a further improvement of the quality of MOVPE grown boron nitride, which is crucial for any possible application.

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[2] Y. Kobayashi, T. Akasaka, T. Makimoto - J. Cryst. Growth 310 (2008) 5048–5052.

[3] X. Li, S. Sundaram, Y. E. Gmili, T. Ayari, R. Puybaret, G. Patriarche, P. L. Voss, J. Paul Salvestrini, and A. Ougazzaden - Cryst. Growth Des. 2016, 16, 3409–3415

[4] Xu Yang, S. Nitta, K. Nagamatsu, Si-Young Bae, Ho-Jun Lee, Y. Liu, M. Pristovsek, Y. Honda, H. Amano - J. Cryst. Growth 482 (2018) 1–8