

A Novel Mechano-Chemical Synthesis Route for Fluorination of Hexagonal Boron Nitride Nanosheets.

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Abstract

This paper presents a facile, two-step mechano-chemical route to exfoliate and fluorinate hexagonal boron nitride nanosheets (BNNs). The influence of fluorine (F) chemisorption on the optical and magnetic properties of BNNs is investigated. It has been observed experimentally, by increasing fluorine concentration, band gap lowers from ~ 5 to 4.17 eV and saturation magnetization and coercivity achieves the value of 1.8322×10^{-3} emu/g and 157.25 Oe, respectively. Furthermore, results strongly supported that during synthesis there is a direct correlation between different number of few atomic layers and adsorption of fluorine atoms towards fluorination of BNNs. More over the defective boron sites are thermodynamically most stable and favorable for fluorine adsorption to form stable B-F bonds as compared to N-F bonds. Such observations are additionally supported by theoretical calculations considering various possible fluorine-based defects in h-BN nanostructure. Hence, a narrow optical band gap with a room temperature weak ferromagnetic diluted magnetic semiconducting behavior of BNNs via fluorination will expand their usage in designing/fabricating magnetic, electronic and nano-devices.

Keywords: BNNs; exfoliation; ball milling; fluorination.



Biography:

Mr. Aqrab ul Ahmad studied Physics at the Govt College University Faisalabad, Pakistan and graduated as MS in 2015. He then joined the research group of Prof. Hongwei Liang at the Institute of Physics and optoelectronics technology, Dalian university of technology China. Now days, he is final year PhD

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Speaker Publications:

1) Aqrab ul Ahmad, Hongwei Liang, Qasim Abbas etc...

A novel mechano-chemical synthesis route for fluorination of hexagonal boron nitride nanosheets. Impact factor 3.5

2) Qasim Abbas, Hongwei Liang, Jianjun Shi, Yuanpeng Chen, Xiaochuan Xia, Aqrab ul Ahmad, Jianxun Liu, Guotong Du
Growth and characterization of amorphous boron nitride dielectric films on Si via RF sputtering at room temperature
Impact factor 3.0

3) Hongwei Liang, Qasim Abbas, Yuanpeng Che, Jianjun Shi, Xiaochuan Xia Aqrab ul Ahmad.

Chemical vapor deposition synthesis of sp²-BN film on 2-inch Si substrates for bipolar resistive random access memory device
Impact factor 2.7

4) Muzammil Iqbal, Duy Khoe Dinh, Qasim Abbas, Muhammad Imran, Harse Sattar, Aqrab ul Ahmad
Controlled Surface Wettability by Plasma Polymer Surface Modification
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5) Seemab Iqbal, Muhammad Fakhar-e-Alam, Nasar Ahmed, Aqrab ul Ahmad, N. Amin, Raed ahmed Alghamdi, Atif Hanif and W. Aslam Farooq

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