



Material Science 2020: A Novel Mechano-Chemical Synthesis Route for Fluorination of Hexagonal Boron Nitride Nanosheets - Aqrabul Ahmad- Dalian University of Technology, China

Aqrabul Ahmad

Dalian University of Technology, China

E-mail: moc.liang@9644barqa.a

Abstract

This paper presents a facile, two-step mechano-chemical route to exfoliate and fluorinate hexagonal boron nitride nanosheets (BNNSs). The influence of fluorine (F) chemisorption on the optical and magnetic properties of BNNSs 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 BNNSs. Moreover 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 BNNSs via fluorination will expand their usage in designing/fabricating magnetic, electronic and nano-devices. Keywords: BNNSs; exfoliation; ball milling; fluorination and band gap calculation.

Recent 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 Chen, 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 Impact factor 2.00
5. Seemab Iqbal, Muhammad Fakhar-e-Alam, Nasar Ahmed, Aqrab -ul-Ahmad, N. Amin, Raed ahmed Alghamdi, Atif Hanif and W. Aslam Farooq Empirical Modeling of Zn/ZnO Nanoparticles Decorated/Conjugated with Fotonol (Chlorine e6) Based Photodynamic Therapy towards Liver Cancer Treatment Impact factor 2.2

This work is partly presented at 18th International Conference and Exhibition on Materials Science and Chemistry- May 18-19, 2020 | Webinar