

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

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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  $1.8322 \times 10^{-3}$  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. 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 BNNs via fluorination will expand their usage in designing/fabricating magnetic, electronic and nano-devices.

Keywords: BNNs; exfoliation; ball milling; fluorination and band gap calculation.

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### 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 scholar in this institution. During his period in PhD he has published more than 8 papers in SCI journal.

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