

## Structural Changes Induced in Graphene Oxide Film by Low Energy Ion Beam Irradiation

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**Abstract :** Graphene oxide consists of  $sp^3$  hybridization along with  $sp^2$  hybridization due to the presence of different oxygen-containing functional groups on its edges and basal planes. However, its  $sp^3$  /  $sp^2$  hybridization can be tuned by various methods to utilize it in different applications, like transistors, solar cells and biosensors. Ion beam irradiation can also be one of the methods to optimize  $sp^2$  and  $sp^3$  hybridization ratio for its desirable properties. In this work, graphene oxide films were irradiated with 100 keV Argon ions at different fluences varying from  $10^{13}$  to  $10^{16}$  ions/cm<sup>2</sup>. Synchrotron X-ray diffraction measurements showed an increase in crystallinity at the low fluence of  $10^{13}$  ions/cm<sup>2</sup>. Raman spectroscopy performed on irradiated samples determined the defects induced by the ion beam qualitatively. Also, identification of different groups and their removal with different fluences was done using Fourier infrared spectroscopy technique.

**Keywords :** graphene oxide, ion beam irradiation, spectroscopy, X-ray diffraction

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