

# Structural Modifications in Magnetic Multi-walled Carbon Nanotubes by Swift Heavy Ion Irradiations: XAS and XMCD Study

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Carbon nanotubes (CNTs) possess unique mechanical and electronic properties suitable for fabricating the nano-scale building blocks of nanodevices [1]. One of the requirements for applications is to modify or cut the CNT in small dimensions in the order of few nanometers. To this respect, we investigate the effect of heavy ion beams irradiation, namely, 120 MeV of Fe- and Co-ion beam irradiation on CNT synthesized by chemical vapor deposition (CVD) technique [2].

The ion fluence selected for this study was  $1 \times 10^{13}$  ions/cm<sup>2</sup>. Ion irradiation was carried out at

Inter-University Accelerator Centre, New Delhi, India. This research reports the experimental results obtained from X-ray diffraction pattern and images of scanning electron microscopy (SEM) and transmission electron microscope (TEM) measured at Advanced Analysis Center, KIST, Korea. These results clearly demonstrate that heavy ions induce modifications in the morphology and magnetic properties of the system. Apart from above studies, the near-edge x-ray absorption spectroscopy investigation has been used to understand the modifications in the electronic structures of MWCNTs.

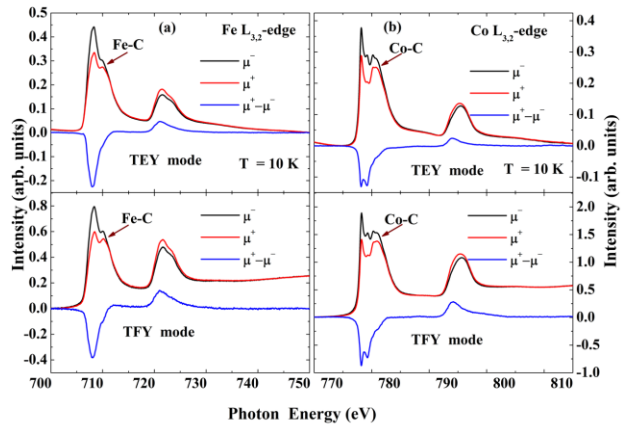


Figure 1: XMCD spectra at Fe and Co L32-edge for FeCNT and CoCNT respectively.

## References

1. E. Wohlfarth, in: G. Rado, H. Suhl (Eds.), *Magnetism, Vol. 3* (Academic Press, New York, 1963).
2. S. Gautam, P. Thakur, S. Augustine, J.K. Kang, J.Y. Kim, et al. *arXiv: 1111.5416v1* (Nov. 23 2011).