

Room Temperature Ferromagnetism on Co and Fe Doped Multi-wall Carbon Nano-tube

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Co and Fe doped multi-wall carbon nano-tubes (MWCNTs) synthesized by microwave plasma enhanced chemical vapor deposition (PECVD) technique are investigated with synchrotron radiations at Pohang Light Source (PAL) and European Synchrotron Radiation Facility (ESRF). Near edge x-ray absorption spectroscopy (NEXAFS) measurement at C K, Co L_{3,2} and Fe L_{3,2}-edges, and x-ray magnetic circular dichroism (XMCD) at Co and Fe L_{3,2}-edges have been carried at 7B1 XAS KIST and 2A MS beamline, respectively, to understand the electronic structure and responsible magnetic interactions at room temperature. X-ray absorption spectroscopy (XAS) at C K-edge shows significant p-bonding and Co and Fe L-edges proves the presence of Co²⁺ and Fe²⁺ in octahedral symmetry. Co and Fe doped MWCNTs show good XMCD spectra at 300K. The effect on the magnetism is also studied through swift heavy ion (SHI) radiations and magnetism is found enhanced and change in the electronic structure in Co-CNTs is investigated. ^{3,2}

Keywords: Electronic structure, Ferromagnetism, MWCNT, XAS, XMCD