**Physics of Carbon Nanostructures**

**이철의 (고려대학교 물리학과 )**

Carbon materials have revealed a number of new phenomena previously unimagined. We have identified the nature of magnetism in the nanostructures of graphite and fullerene (C60) comprising organic elements of carbon and hydrogen only. Newly elucidated half-metallicity in hydrogen-adsorbed carbon nanotubes giving rise to fully polarized spin current will also be addressed. Our work employing a simple model based on the electrostatic potential difference and density functional theory calculations showed that layer-selective half-metallicity can be obtained in bilayer and trilayer graphene nanoribbons by applying electric fields. The half-metallic layers may be switched by reversing the field direction, enabling control of the spin-polarized electric current path.