FERROMAGNETIC CONTACTS ON SINGLE WALL CARBON NANOTUBES

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We are investigating the influence of spin degree of freedom on electrical transport measurements in ferromagnetically contacted Single Wall Carbon Nanotubes (SWCNT) in presence of an external magnetic field.

On a waver with predefined alignment markers SWCNT were grown by chemical vapor deposition (CVD). After their positional detection w.r.t. these markers under an atomic force microscope (AFM) ferromagnetic $Pd_{1-x}Fe_x$ contacts (x=0.2,…,0.5) were written using electron beam litography. Two additional non-ferromagnetic contacts allow four-point measurement geometries. On Si/SiO_2 samples the substrate serves as a backgate.

An external magnetic field $B_{\|}$ along their magnetic easy axis governs the relative magnetization configuration of the first $Pd_{1-x}Fe_x$ contact (spin injector) and the second $Pd_{1-x}Fe_x$ contact (spin detector) as, through choice of different aspect ratios, the contacts have different coercive fields. Possible configurations are parallel or antiparallel.

By means of Lorentz microscopy in a tunnelling scanning microscope (TEM), the magnetization switching behaviour of contacted SWCNT prepared on thin (30nm) Si_3N_4 membranes will be observed in-situ.