

THU 12**Thermal diffusivity of aligned multi-walled carbon nanotubes measured by flash method**

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Thermal diffusivity of freestanding, CCVD grown, multi-walled carbon nanotube (MWCNT) forests (height of 1.5 and 1.9 mm) was characterized in the temperature range between 25 and 200 °C. Copper and Al-alloy metal blocks were used as reference for validation of the experimental setup. The measurements were carried out along the MWCNT alignment direction with thermal properties analyzer that uses the flash method. The thermal diffusivities measured at room temperature for both as-grown and post-annealed (2h at 480 °C in open air) samples were found to be ~ 0.45 cm²/s and ~ 0.2 cm²/s, respectively. In both cases, the thermal diffusivity values were slightly decreasing in increasing temperature. The observed decrease in diffusivity after annealing is most probably due to an increased defect density in the nanotube walls resulting in a more pronounced phonon scattering in the lattice. The measured thermal diffusivities for as-grown samples agrees with data reported elsewhere for similar MWCNT materials [1, 2].

THU 13**Photosynthetic reaction center protein in nano structures**

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Photosynthetic reaction center (RC) is one of the most important protein, because it is Nature's solar battery converting light energy into chemical potential in the photosynthetic membrane assuring conditions for carbon reduction in cells. Alt-

though it is developed in nanometer scale, and is working in nanoscopic power, this is the protein that assures the energy input practically for the whole biosphere on Earth. The extremely large quantum yield of the primary charge separation (close to 1) in the RC offers a big challenge to use it in nano-devices. It will be shown by AFM, EM that RC can be bound to different carrier matrices (like CNTs, ITO). The photochemical activity by optical and electro chemical investigations can be measured in this bio-nanocomposite system.

THU 14

Influence of the Matrix Elements on the Dominant Phonon Wavevectors for the 2D Raman Mode in Graphene

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We determine the dominant phonon wavevectors q contributing to the 2D mode in graphene using a full two dimensional calculation of the Raman matrix element $K_{2f,10}(q)$ while including the variation of the optical and electron-phonon matrix elements. The dominant wavevectors are highly anisotropic and rotate with the polarizer:analyzer orientation. The associated dominant electronic transitions are no longer parallel to the high symmetry $K - M$ direction, showing a small but significant component along $K - \Gamma$ and connect the regions where the product of the ingoing and outgoing optical matrix elements is most intense. Our findings are crucial for the reliable interpretation of phonon mapping experiments on graphene and its allotropes especially in the context of symmetry breaking potentials such as uniaxial strain and we foresee an opportunity for phonon mapping experiments to accurately map the angular dependence of their phonon dispersions.

THU 15

Revealing the grain structure of graphene grown by chemical vapor deposition

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