Molecular functionalization of graphene is a key to materials applications. This could be by covalent and non-covalent strategies, the latter more interesting since this causes no damage to the carbon lattice, but also more challenging since this can be more difficult to detect by “standard” graphene methods such as Raman spectroscopy, microscopy (light, AFM, STM and TEM). Pyrene derivatives are established tools for non-covalent functionalization of carbon nanotubes that should interact with graphene in the same fashion.

Spectroscopy

Spectroscopy

Microscopy

Spectroscopy

Microscopy

Photophysically interesting?

The fluorescence spectra of compound 1 in iso-propanol, excitation at 240 nm (Left). The intensity at all wavelengths decreases with addition of increasing amounts of graphene suspension in the same solvent. The intensity decrease is larger than what is observed when adding only solvent to compound 1, shown graphically in the right panel.

The fluorescence spectra of compound 3 in CHCl₃ with addition of increasing amounts of carbon nanotube solution (CNTs), excitation at 350nm. As expected, the intensity of the fluorescence decreased.

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