Study of photoinduced charge transfer between conjugated polymers and Single Wall Carbon Nanotubes

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The photo active role of SWNT as potential acceptor has been claimed to improve the potential of an excitonic solar cells. While improved efficiency has been observed in some cases the origins of the effect are not clear due to that fact that structure and purity of SWNT (presence of catalyst , shape , semiconducting vs. metallic tubes) are not well defined. Thus both active participation of SWNT in the photovoltaic process and transport may affect the measured parameters. In order to understand the origins of the contribution of SWNT to the performance of organic solar cells, we investigated light induced charge transfer between SWNT and conjugated polymer as well as the ternary system P3HT –PCBM SWNT (poly(3-hexylthiophène) phenyl-C_{61}-butyric acid methyl ester -Single Wall carbon Nanotube) via light Electron Spin Resonance (LESR). As the SWNT are ESR silent, the only indication of interaction with polymer, is the change of the line shape of the polymer signal. The intriguing result show that different types of SWNT have different interactions with the conjugated polymer and surprisingly the presence of metallic SWNT does increase the positive polarons of P3HT. The introduction of MWNTs does no modify the line shape of the P3HT which is in agreement with the theory. Morphology and photoluminescence studies were carried out as well to complete the investigation.