

# **Photophysics at Nanoscale using time-resolved Ultrafast Spectroscopy**

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Ultrafast lasers offer unique possibilities to control and probe transient processes in nano materials. Following photoexcitation by a femtosecond laser pulse, the carrier dynamics includes many important processes like thermalization, energy relaxation, exciton formation and spin dynamics which are impacted by dimensionality. Their understanding is crucial not only for many optoelectronic applications, but also to gain a deeper understanding of physical processes in nano-materials. My talk will discuss some of our recent work on the dynamics of optical pump induced photocarriers in single and bilayer graphene, graphane (hydrogen functionalized graphene) and carbon nanotubes as probed by time-resolved optical pump-terahertz probe spectroscopy.

Our recent ongoing work on tunable Plasmon-assisted generation of hot carriers in graphene on an ultrathin gold film with periodic array of holes (showing anomalous transmission resonances) as probed by ultrafast time-resolved differential reflectance will also be discussed.