

Molecular clocks: pico- and femtosecond electronic dynamics

Albano Cossaro e Martina Dell'Angela

(ISTITUTO OFFICINA DEI MATERIALI – CNR)

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High-brilliance light sources can be exploited to reveal charge dynamics processes the organic molecules may be involved in, at timescales ranging from femto- to picoseconds. The description of these phenomena not only is interesting for fundamental science, but paves the way to the development of efficient electronic devices in the emerging field of organic electronics, the technology that aims at replacing silicon and other inorganic semiconductors with organic ones. The characterization of the electronic dynamics in prototype systems is the route to define molecular synthesis and film growth protocols in order to optimize the efficiency of real devices. In this talk we will briefly introduce the main X-ray spectroscopy techniques and their time-resolved implementation to the study of prototypical molecular systems. In particular, we will discuss few case studies in which the temporal resolution of Pump/Probe or resonant photoemission spectroscopies is exploited and we will describe how these methods are implemented in facilities like synchrotrons and free electron laser