Measurement of: Time resolved spectroscopy with Transient Absorption measurements using the femtosecond laser system can be utilized to analyze the charge carrier dynamics and their lifetime in various materials.

Equipment: Transient Absorption Spectroscopy

Property Measured: Lifetime

Photograph (small size)

Basic Principle & Capabilities:

The transient absorption spectroscopy system at NPL comprises of an Ti:sapphire oscillator, regenerative amplifier coupled with an Operational Parametric Amplifier (OPA). The Oscillator is basically a Verdi Pumped Micra system whose output (~ 350mW power with 800nm pulses) is seeded to the Regenerative Amplifier which delivers 4mJ energy output in the form of 800nm pulses with the pulse width of 35fs at 1KHz repetition rate. This output further divides into 2 portions : one is seeded into OPA (TOPAS) producing 290nm to 2600 nm thus covering from UV to NIR region with an output pulse duration of 80fs while other is fed into spectrometer (HELIOS) passing through a delay stage of 0-8ns which further falls on sapphire crystal producing white light continuum as a probe pulse. The former pulse (pump pulse) excites the sample under study and passes the information of excited state dynamics to the probe pulse. Then the probe pulse delivers the information to the detector and the obtained carrier dynamics were analyzed by using Surface Explorer software.

Sample Requirement:

The customer should provide the complementary data acquired on the samples (like PL, UV-Vis-NIR, SEM etc) in order get proper analysis. The sample data can be acquired either in the reflection mode or the transmission mode; accordingly the sample should be prepared. The cuvettes, micropipette etc should be provided by the customer. For thin films on substrate the substrate size should be minimum 10mmx10 mm. The chance of sample damage by the intense laser beam cannot be ruled out. The measurements done for the Vis and NIR will be dealt separately.