**Photocurrent Spectroscopy on Organic Semiconductors by Lock-in Amplification**

Adriaan van der Feltz

Experimental Physics – Department of Science – Utrecht University

avanderfeltz@gmail.com

Organic semiconductors differ from their inorganic counterparts in their bonding type and strength. The intermolecular type of bonding seen in organic, carbon based, materials results in a different electronic band structure compared with inorganics. Spectroscopy measurement on the current induced by photon absorption provides a nondestructive method of determining this band structure along with connected optoelectronic properties of organic materials. In the present work, the focus is on two of the best performing molecules among organic materials, rubrene and TIPS-pentacene, studied under different morphological shape and thicknesses, varying between single free standing crystals to thin films. The aim is better insight in how the above mentioned properties depend on sample thickness and morphology.

Due relative signal strength and noise considerations a lock-in amplification method is used to resolve clear experimental results. A study of lock-in amplification shows the broader potency of this technique to measurements with a temporal modulated signal. In particular, an introduction will be provided how lock-in amplification combined with the developed experimental setup can be applied for future photocurrent spectroscopy along with other spectrally resolved, low signal or high noise measurements.