Summery

Since the demonstration of photoinduced charge transfer and first devices in the early-to-mid nineties polymer-fullerene blends are widely used to build organic solar cells. A very common opinion states that, upon blending these materials, there are in general no ground-state interactions observable. This conclusion has been drawn from the observation that absorption spectra of the individual materials behave simply additive in a thin film solid-state blend and no additional transitions were observed. In contrast, recently published data obtained by highly sensitive methods such as photothermal deflection spectroscopy and Fourier-transform photocurrent spectroscopy revealed a significant absorption below the individual band gap of each material in the blend. Employing highly sensitive external quantum efficiency measurements, we found that these optical transitions indeed contribute to the short circuit photocurrent of the solar cell. Therefore a deeper understanding of the origin of these transitions is desirable and aimed at within the scope of this project. Based on complementary optical and charge transport data to be collected within this project, two models are to be evaluated: a) disorder and/or defect related absorption and b) the absorption of a ground-state charge-transfer complex (exciplex absorption).