Diploma thesis abstract

«*Ultrafast photoinduced absorption spectroscopy of donor-acceptor compositions based on organic semiconductors*»

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This work is aimed at studying of novel donor-acceptor semiconducting organic small molecules (SSM). These molecules contain triphenylamine (TPA) as donor unit and dicyanovinyl (DCV) as acceptor unit. This type of SSMs has recently shown promising performance as a donor in organic solar cells.

In this work, charge generation and recombination processes has been studied in thin films of pristine SSMs as well as of SSM:$PC_{70}BM$ blends. SSMs differed from each other by the alkyl end group's length (2 or 6 carbon atoms) and by the conjugated chain's length (2 or 3 thiophene rings).

Charge dynamics were studied by time-resolved photoinduced absorption spectroscopy. Measurements were performed at the timescale of 100 picoseconds with time resolution of ~100 femtoseconds.

Times of intramolecular recombination in films of pristine SSMs as well as intermolecular recombination in films of SSM:$PC_{70}BM$ blends have been measured. The timescales turned out to be of 10 and 20 picoseconds correspondingly. It was shown, that intermolecular recombination becomes dominant for high $PC_{70}BM$ concentrations, and the threshold values of this concentration depend on SSM's alkyl end group's length.

The timescale of electron transfer from SSM to $PC_{70}BM$ has been estimated. The intermolecular charge-transfer process appears to be relatively slow, and it occurs at timescales of more than 1 picosecond.