

## Spectroscopic Characterization of NIR absorbing Charge-Transfer Complexes

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Intermolecular electron transfer involves the formation of a complex between the donor (D) and the acceptor (A) species, called charge-transfer complex.<sup>1</sup> Different systems resulting from the interaction of electron-rich and electron-poor compounds were characterized using UV-Vis-NIR steady-state electronic absorption spectroscopy. Six possible charge transfer complexes, resulting from two donor compounds, TMPD (*N, N, N', N'*-tetramethylphenylendiamine) and TTF (tetrathiafulvalenium), and three acceptor compounds, TCNE (tetracyanoethylene), TCNQ (tetracyano-*p*-quinodimethane) and TCBQ (2,3,5,6-tetrachloro-1,4-benzoquinone).

When isolated, the absorption bands of both donor and acceptor compounds are in the UV-Vis range, between 250 and 450 nm. When donor and acceptor species interact, a new broad band appears in the NIR, between 900 and 1500 nm. This band is assigned to the charge transfer complex. It was identified the formation of four of the six possible complexes: TMPD/TCNE, TMPD/TCNQ, TPMD/TCBQ and TTF/TCNE.

The stability of these complexes was followed at different time points. The effects of temperature, solvent polarity and relative concentration of donor and acceptor species were studied in order to optimize the formation of the charge-transfer complex. This highlights two complexes for future characterization of the kinetics of their formation and decay.<sup>2</sup>

### References

- [1] Rosokha S V., Kochi JK. *Acc Chem Res.* **2008**;41,641-653.
- [2] Vauthey E. *J Photochem Photobiol A Chem.* **2006**;179, 1-12.