Reversible Functionalization of Conjugated Aromatic Polymers *via* Imine Linkage for Electronic Applications

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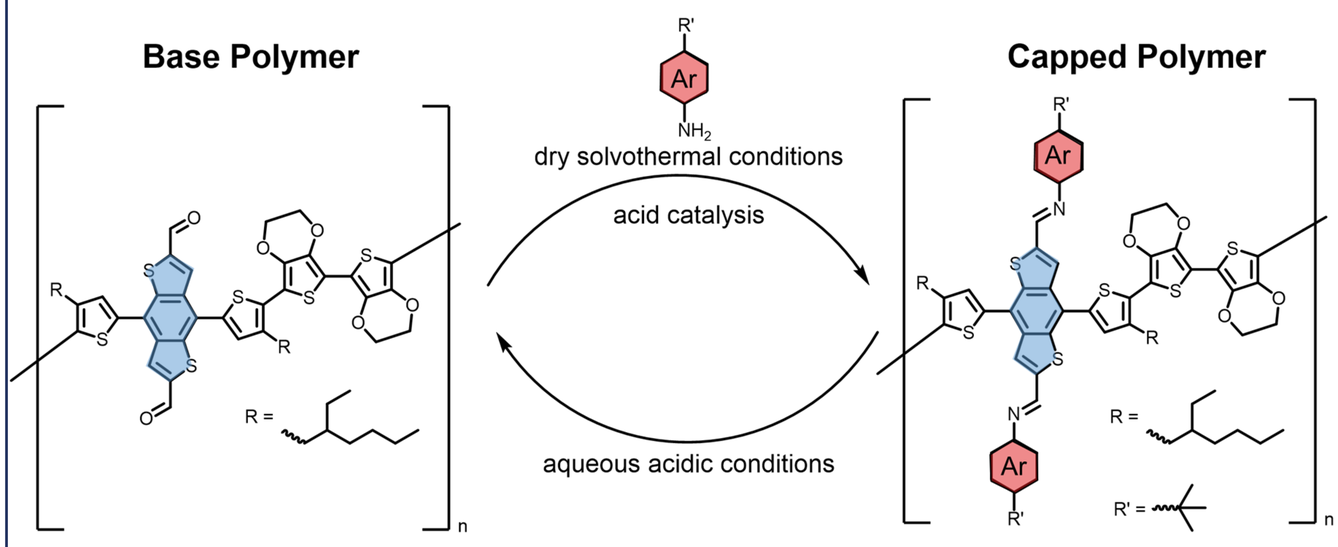
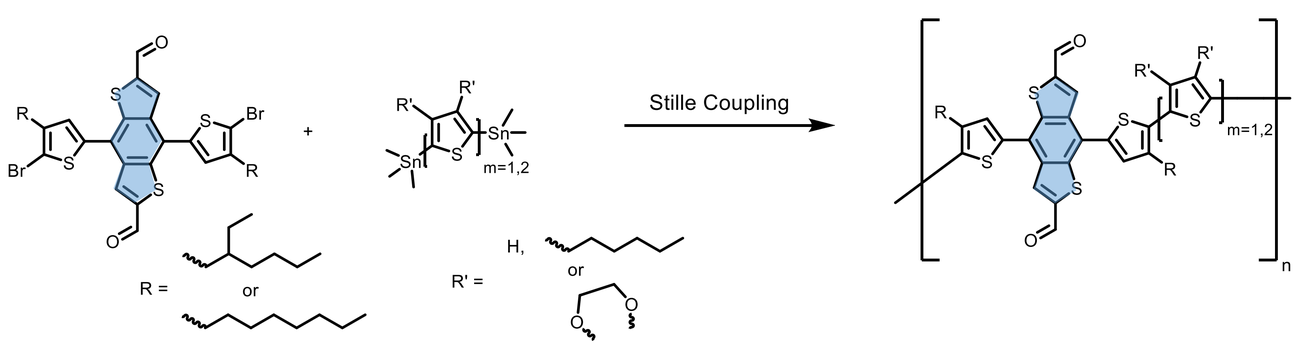
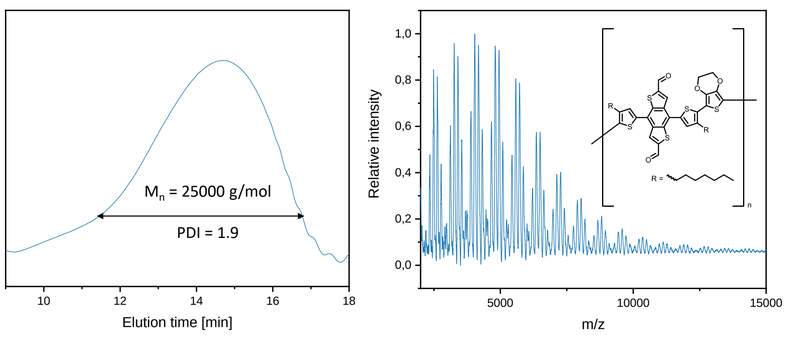
Concept of Reversible Post-Fuctionalization

- Flexible tuning of base polymer properties *via* conjugated aromatic imine capping
- Controlled degradation of imine linked linear polymers reported in the literature[1]
- Cleavage of capping *via* variation of water content, acidity and additives



- Conjugated polymers bearing aldehyde moieties are suited for postmodification *via* reversible imine groups
- Successfull synthesis of soluble benzodithiophene (BDT) based polymers as model structures

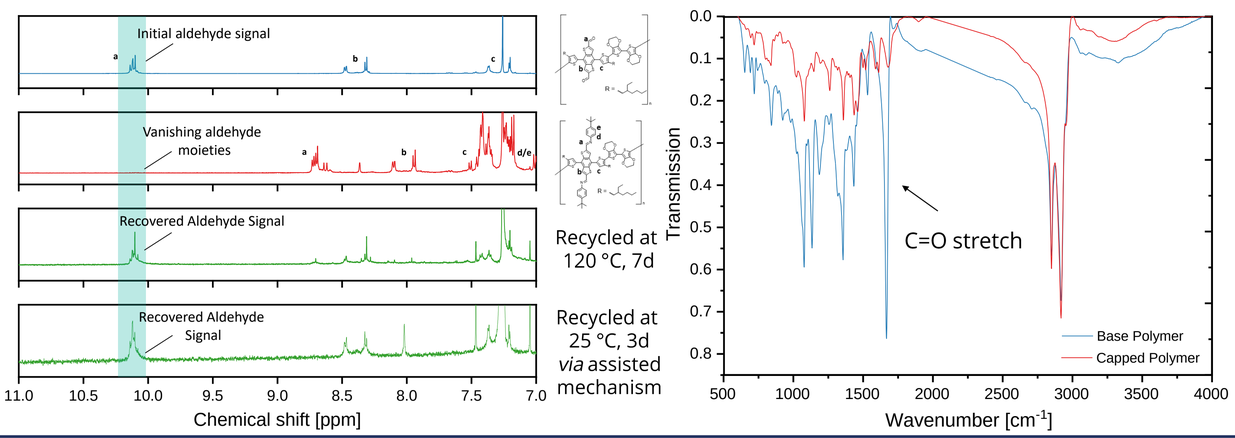




- M_n up to 25000 g/mol observed in GPC
- High masses of polymers shown in MALDI–TOF

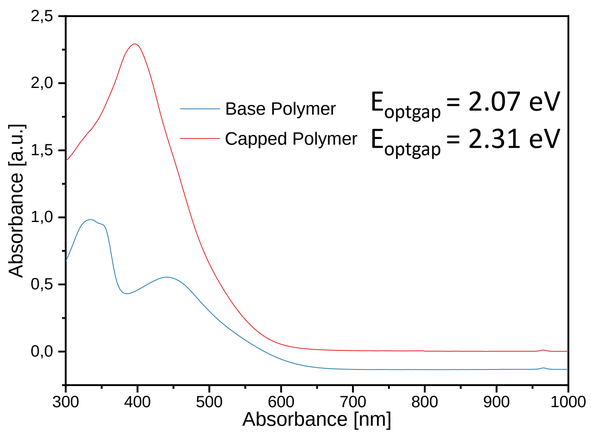
Screening of Conversion

- Confirmation of aldehyde conversion with established methods such as NMR and FTIR
- Typical degradation involves harsh conditions up to 120 °C
- Tuning of water content, acidity and additives lowers required conditions to room temperature



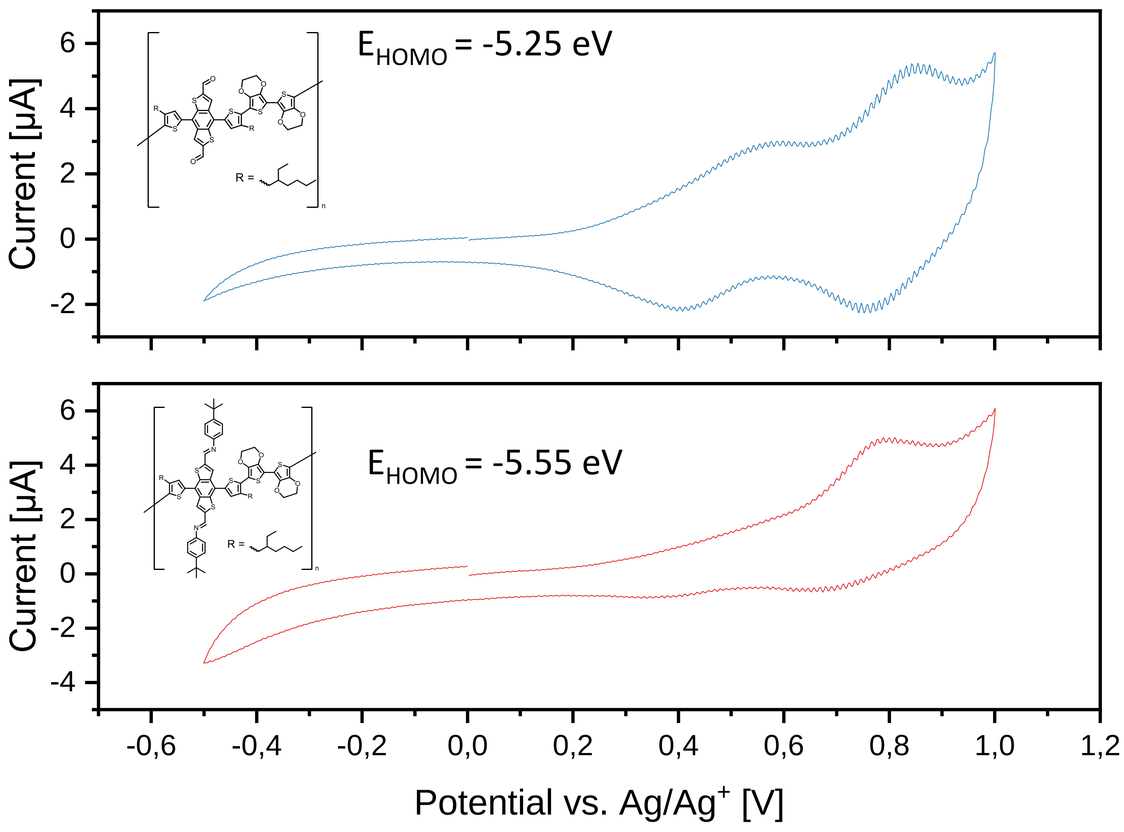
Property Characterization

- Base and capped polymers characterized *via* UV/Vis in solution
- Solid state characterization *via* IR



- Variation of optical bandgap by introduction of capping units
- Change of optical bandgap in fully capped polymer of up to 0.24 eV
- Significant change in absorption maximum

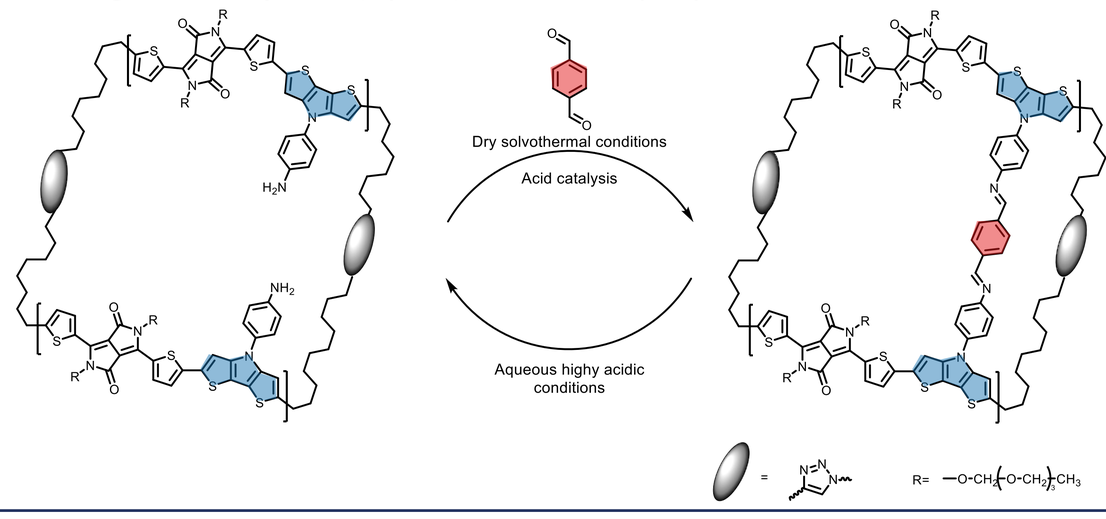
- Polymer modification through imine bonds allows tuning of optoelectronic properties as shown by cyclovoltammetry
- Potential for reversible change of (opto-)electronics properties in electronic devices



Summary and Future Directions

- Control over reversibility of imine based post functionalization shown
- Further recycling cycles can be attempted

- Investigation of Imine reversibility on pre-assembled macrocycles
- Tuning solubility and (opto-) electronic properties



References

[1] N. Nozaki, A. Uva, H. Matsumoto, H. Tran, M. Ashizawa, *RCS Appl. Polym.* **2024,** 2, 163–171.

Acknowledgements

The authors acknowledge support by the DFG CRC 1415 project.
T. E. gratefully thanks Dr. Mikhail Malanin for measuring the IR spectra and Dr. Ningwei Sun for measuring UV/Vis

Funded by
Deutsche Forschungsgemeinschaft
German Research Foundation