

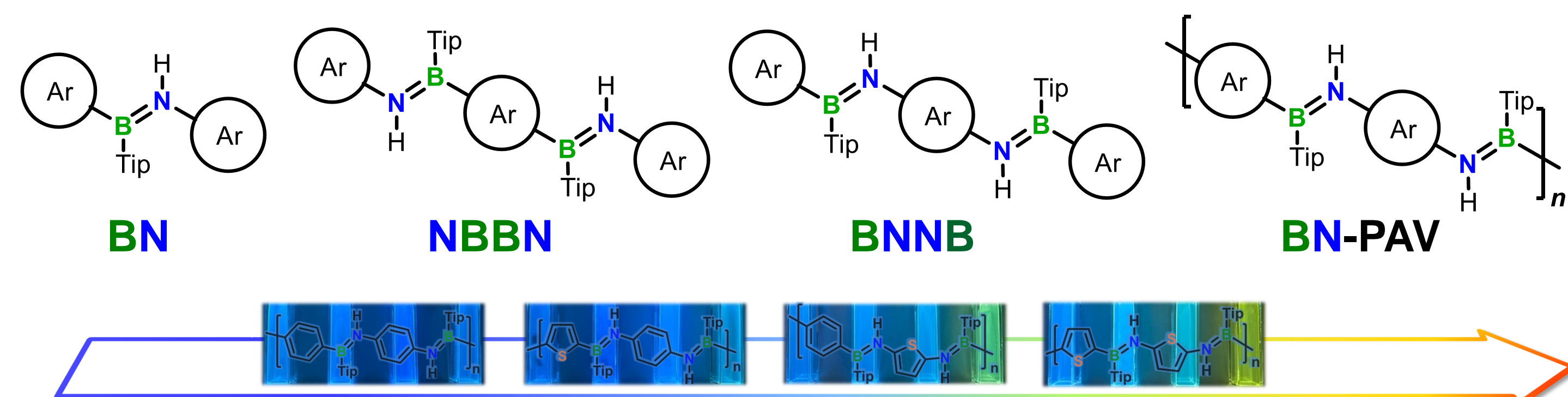
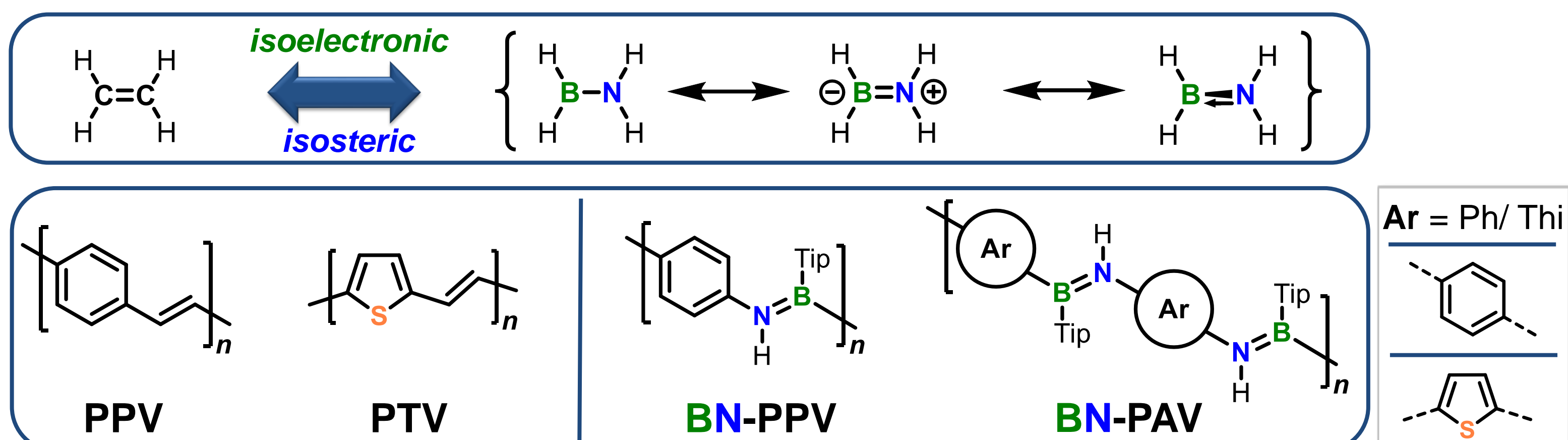


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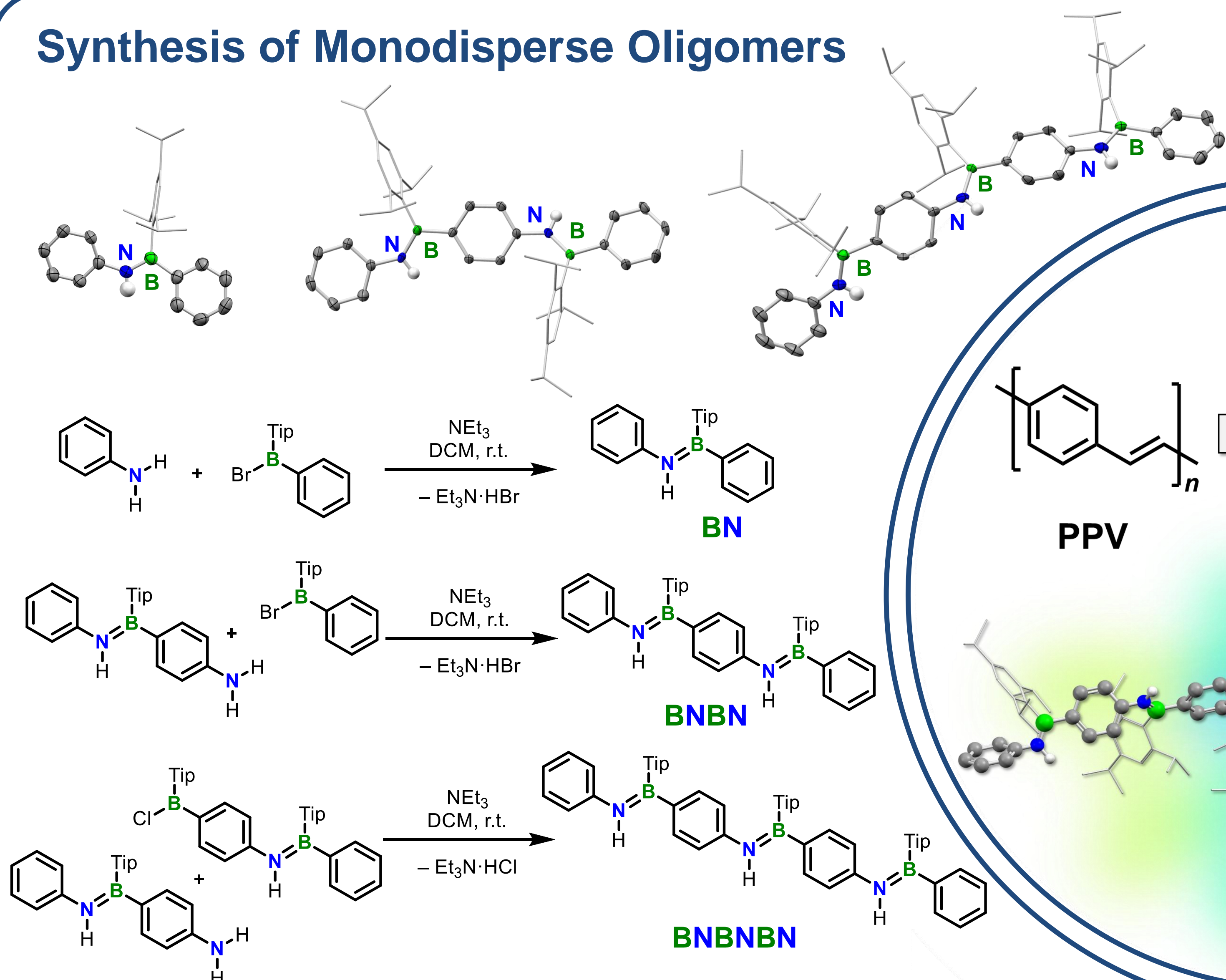
Introduction

The substitution of selected CC units by isoelectronic and isosteric BN units in polyaromatic compounds has evolved into a powerful approach for accessing novel materials with often intriguing properties and functions.^[1] We reported the first poly(*p*-phenylene iminoborane), which is derived from PPV through replacement of its vinylene by B=N moieties (i.e., BN-PPV).^[2]

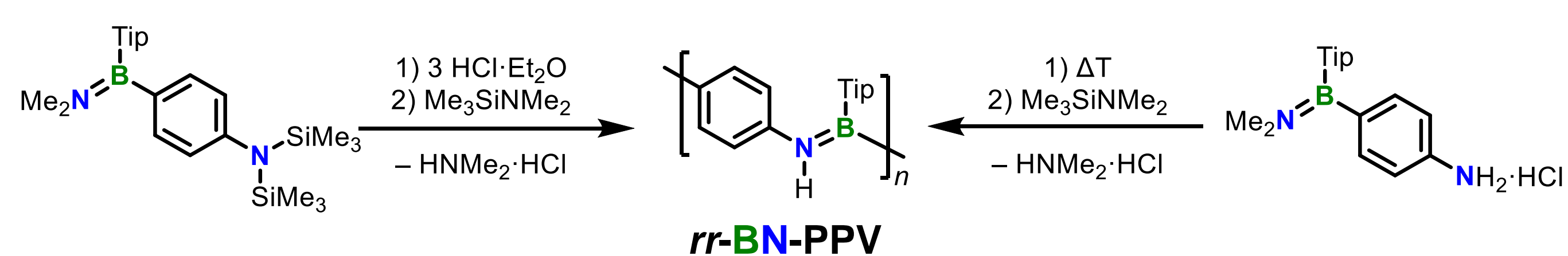


To extend our studies, we targeted a BN/CC isostere of poly(thiophene vinylene) (PTV),^[3] as well as mixed copolymer congeners of both PPV and PTV.^[4] The polymers and monodisperse oligomers showed solid-state fluorescence and aggregation induced emission (AIE), as well as effective π -conjugation over the B=N units. Recently, we also accomplished the synthesis of a strictly alternating regioregular BN-PPV and corresponding monodisperse oligomers. This led to significantly enhanced fluorescence emission in solution and in the solid state.^[5]

Synthesis of Monodisperse Oligomers

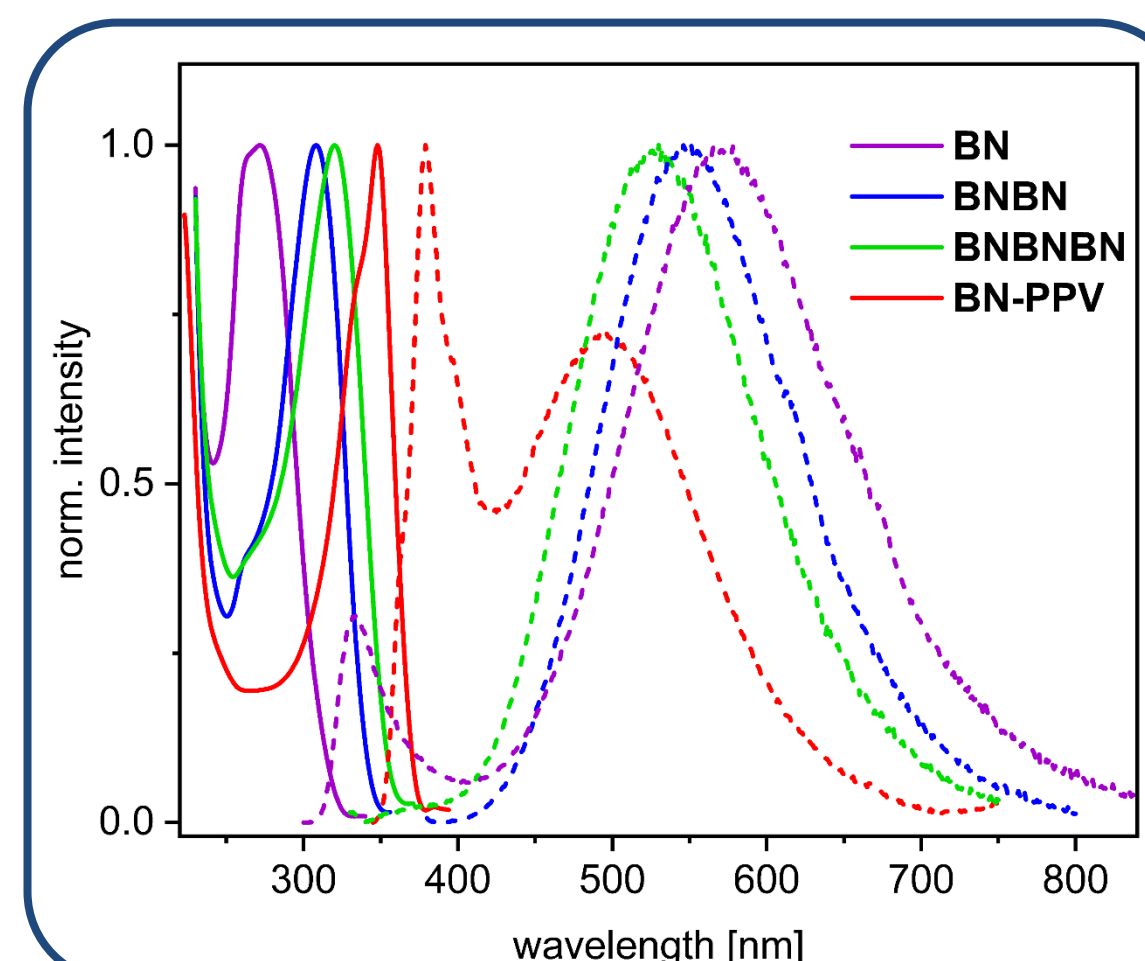


Synthesis of the Polymer

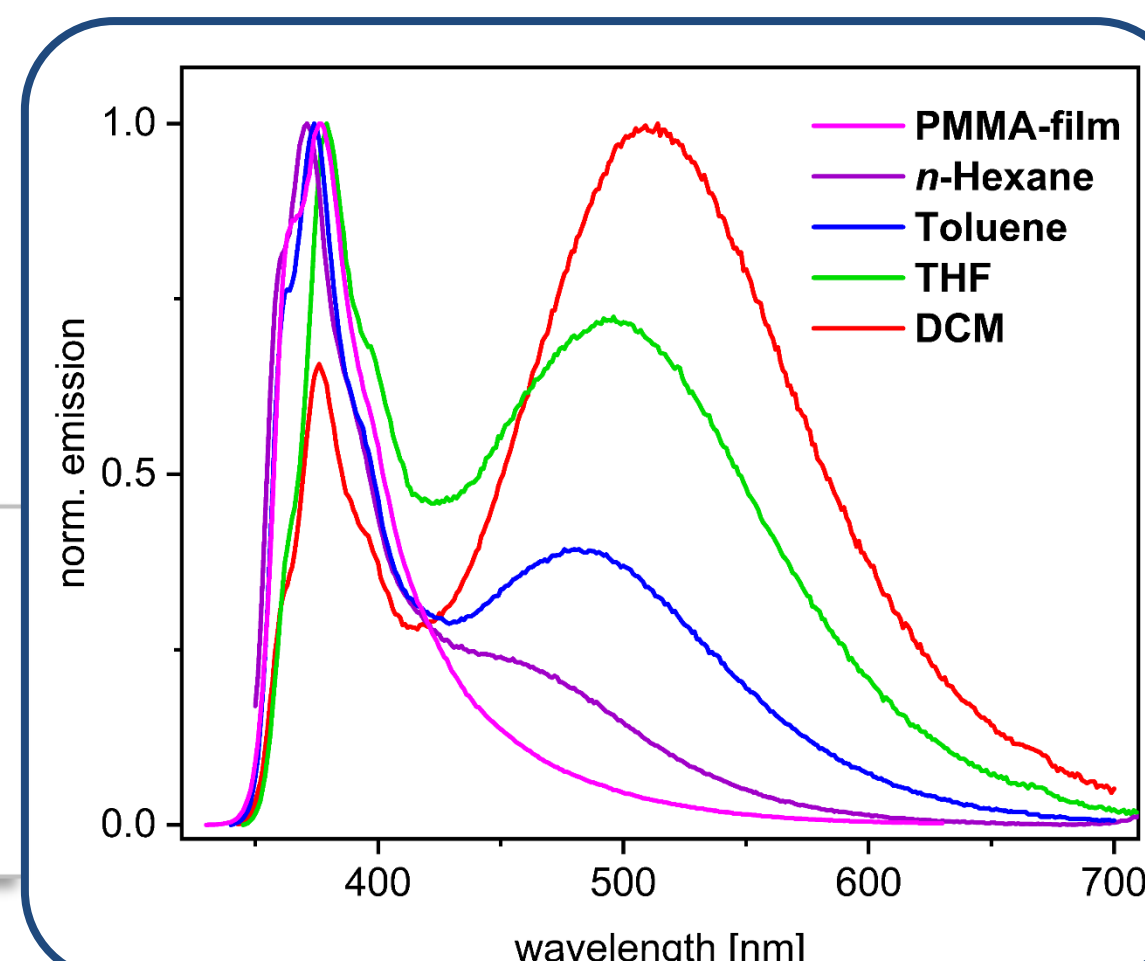


Photophysical Properties

Absorption and Emission in THF



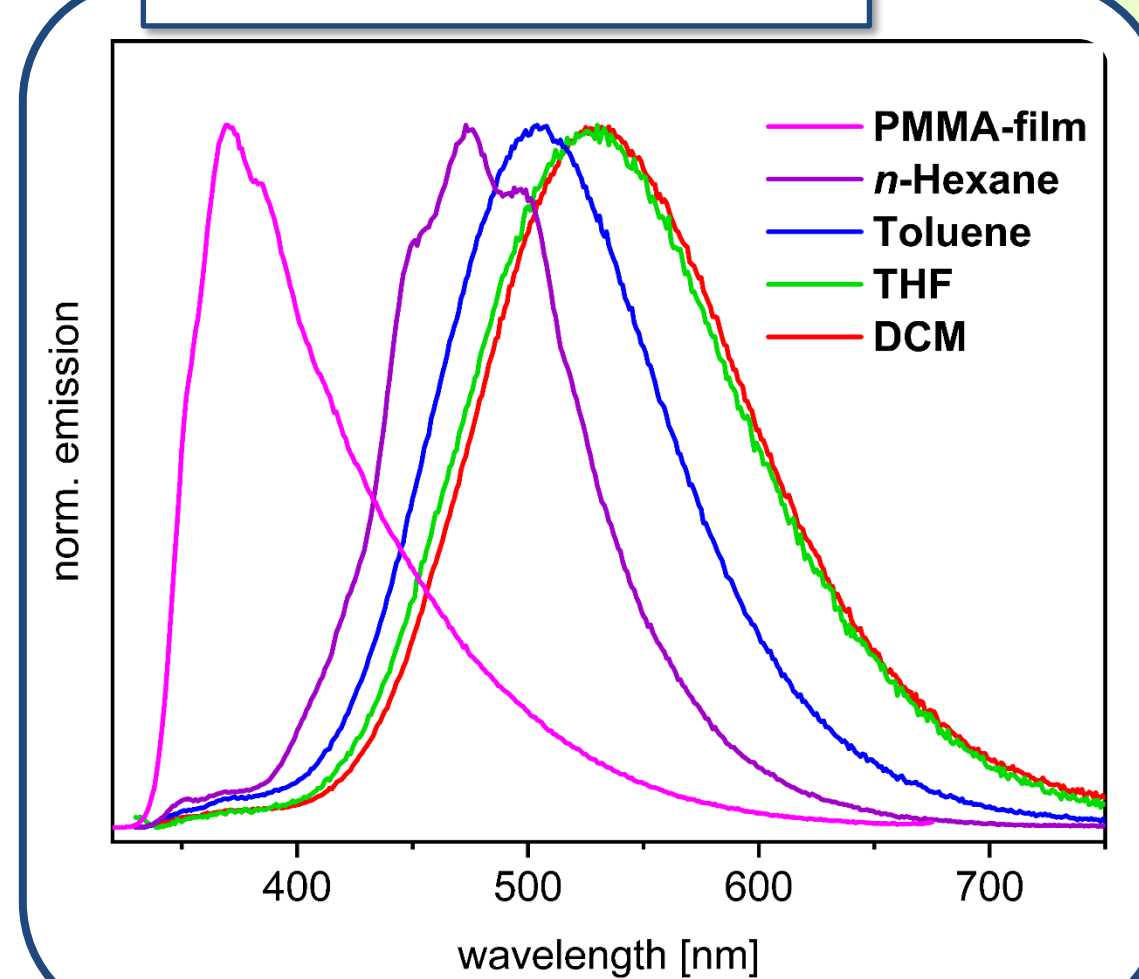
Dual-Emission of rr-BN-PPV



Stimuli-Responsive Behavior

(represented by the BNBNBN oligomer)

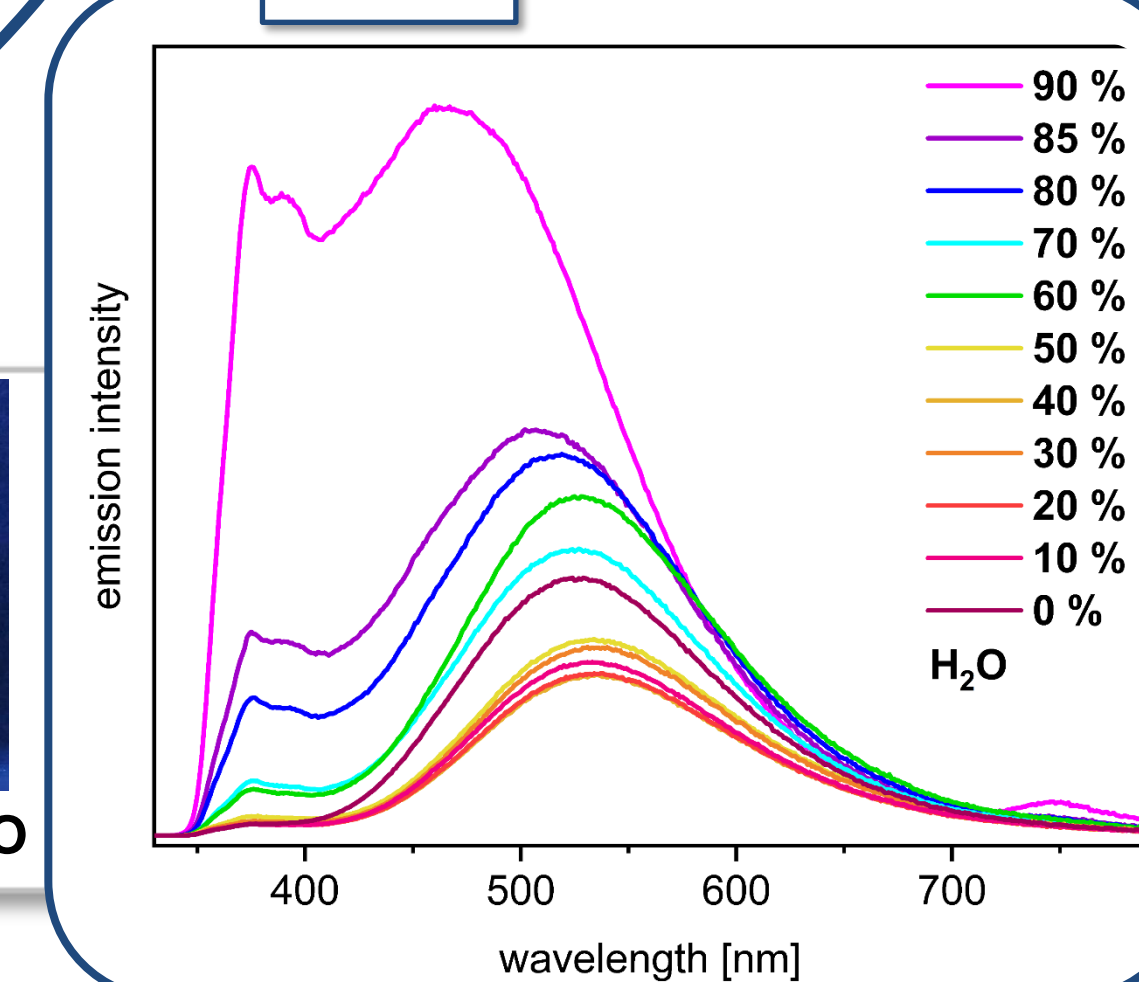
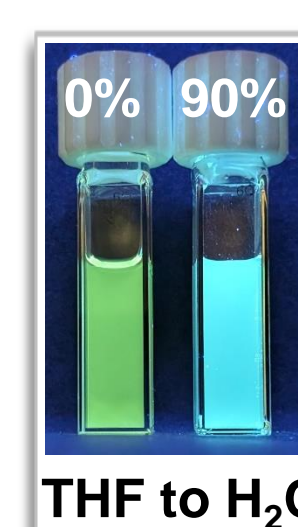
Solvatochromism



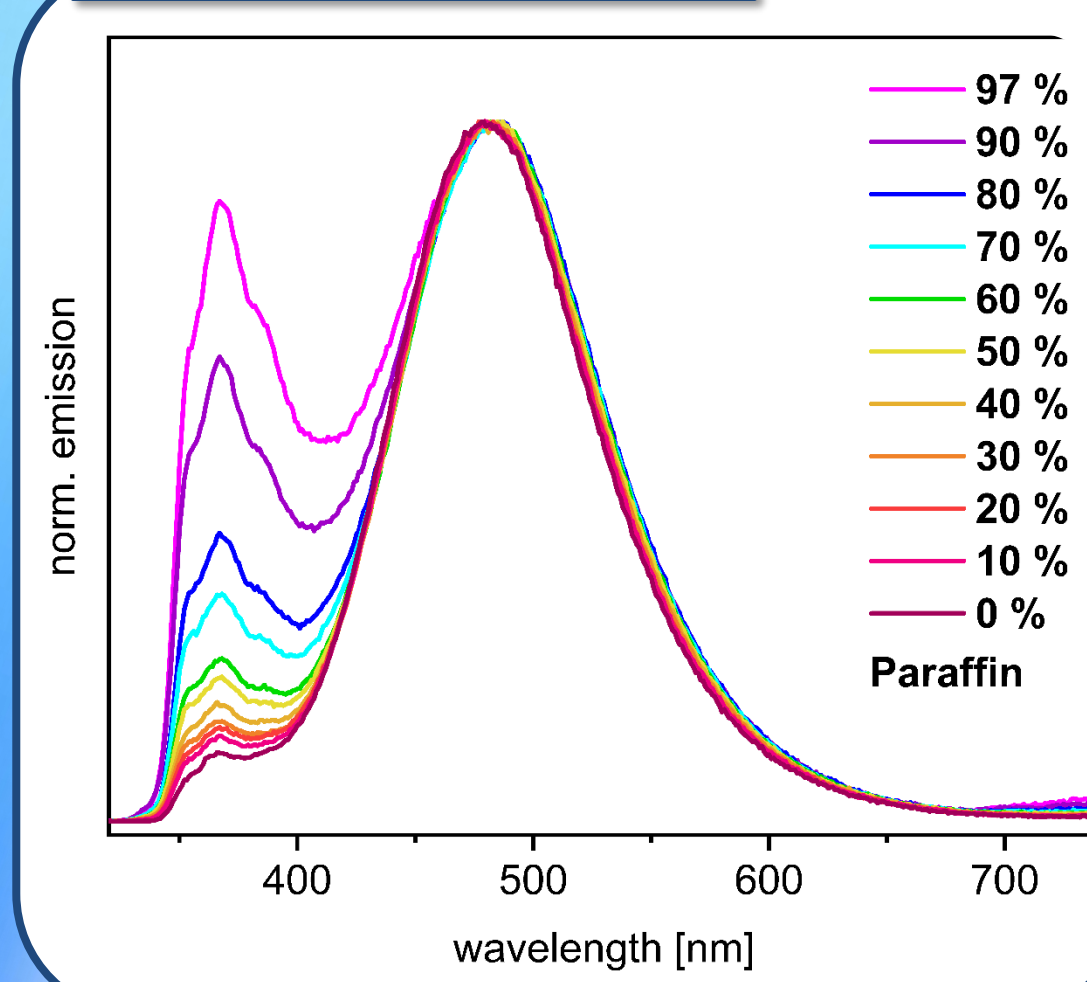
Quantum Yield (Φ)

Φ(PMMA)= 69%
Φ(n-hexane)= 49%
Φ(THF)= 38%

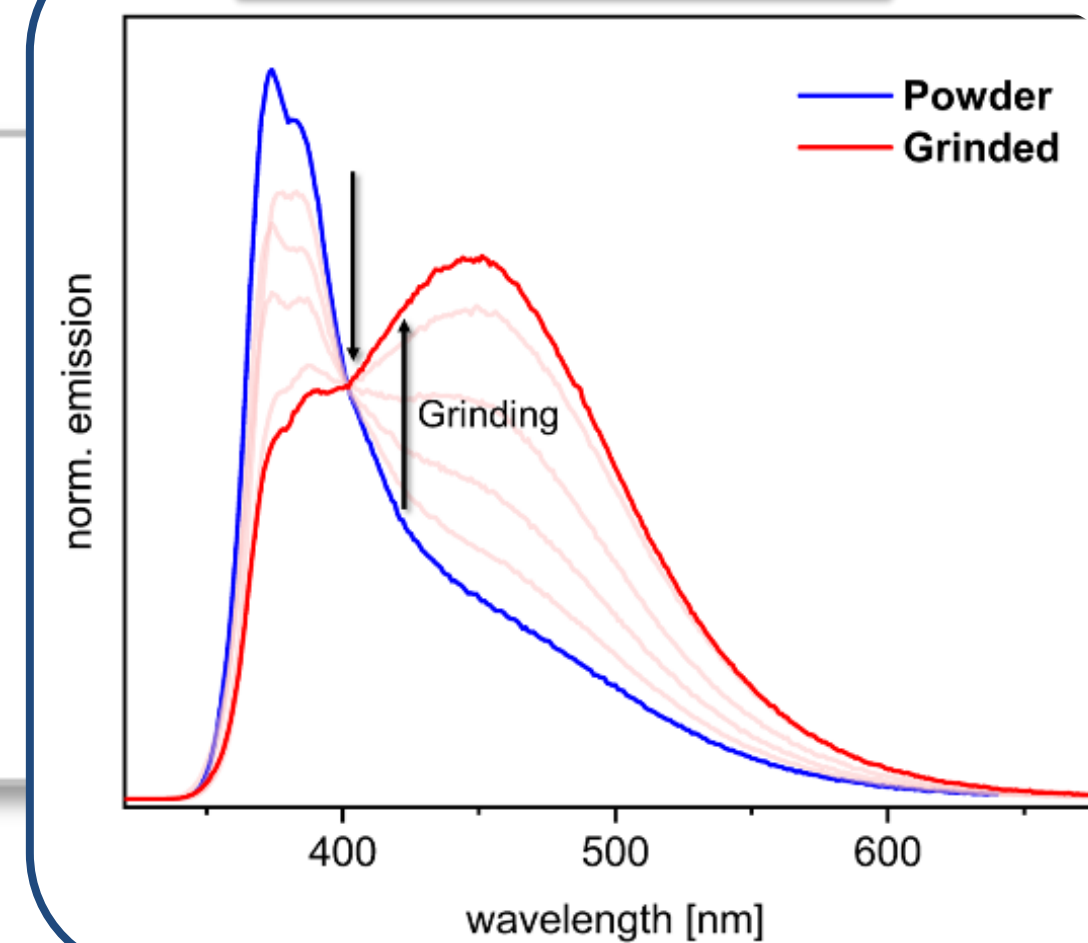
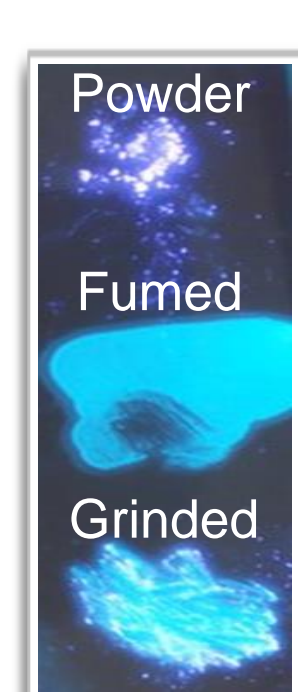
AIEE



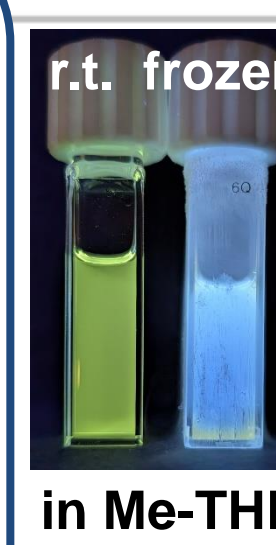
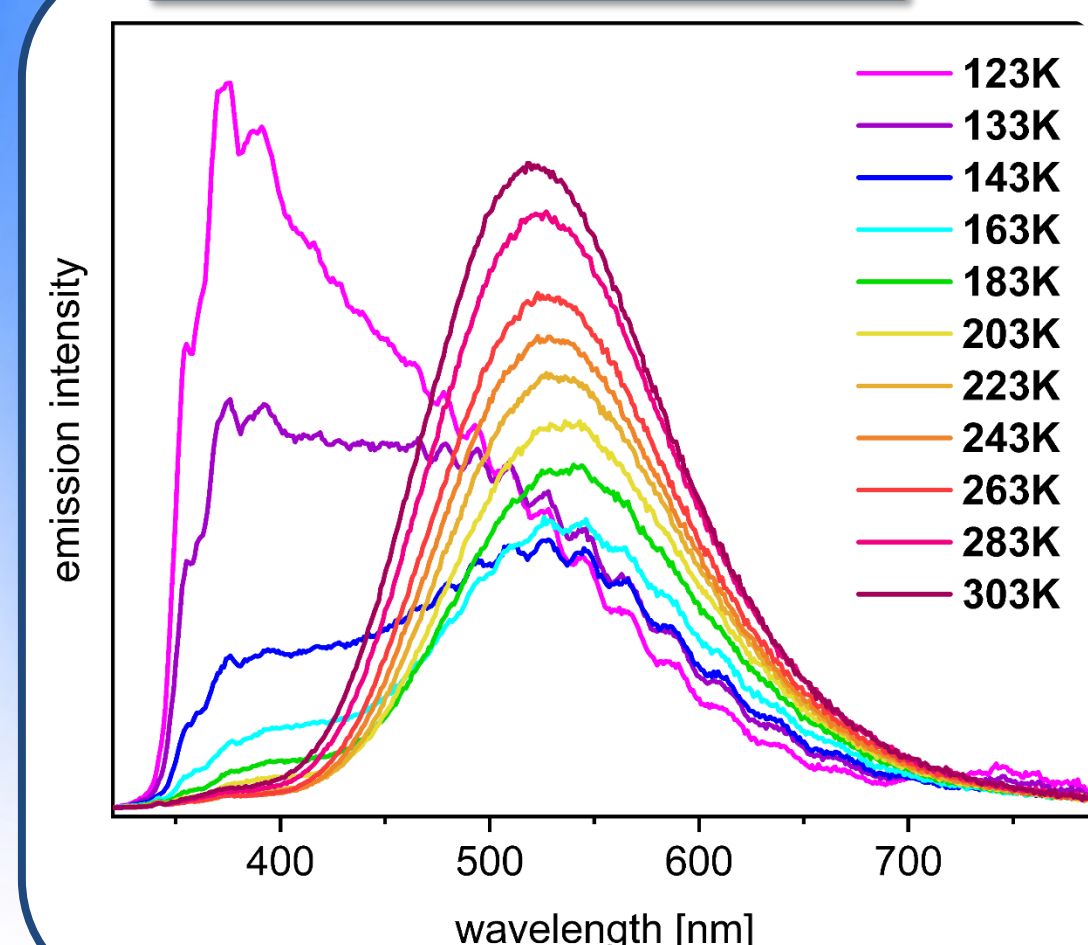
Viscochromism



Mechano-fluorochromism



Thermochromism



Conclusion

We succeeded in the synthesis of several poly(arylene iminoboranes) and monodisperse oligomers. Photophysical measurements revealed solid-state fluorescence and effective π -conjugation over the B=N units by bathochromic shifts in their absorption with increasing chain length. Furthermore, the strictly alternating regioregular BN-PPV compounds showed enhanced fluorescence emission and stimuli-responsive behavior.

Acknowledgement

Financial support by the German Research Foundation (DFG) through the Heisenberg Programme (HE 6171/9-1, 468457264) and the Research Grant HE 6171/6-2 (401739196) is gratefully acknowledged.



References

- [1] a) Z. X. Giustra, S.-Y. Liu, *J. Am. Chem. Soc.* **2018**, *140*, 1184;
b) H. Helten, *Chem. Eur. J.* **2016**, *22*, 12972;
c) M. M. Morgan, W. E. Piers, *Dalton Trans.* **2016**, *45*, 5920;
d) H. Helten, *Chem. Asian J.* **2019**, *14*, 919.
- [2] T. Lorenz, M. Crumbach, T. Eckert, A. Lik, H. Helten, *Angew. Chem. Int. Ed.* **2017**, *56*, 2780.
- [3] J. Chorbacher, M. Maier, J. Klopff, M. Fest, H. Helten, *Macromol. Rapid Commun.* **2023**, 2300278.
- [4] M. Maier, J. Chorbacher, A. Hellinger, J. Klopff, J. Günther, H. Helten, *Chem. Eur. J.* **2023**, *29*, e202302767.
- [5] J. Chorbacher, J. Klopff, A. Friedrich, M. Fest, J. S. Schneider, B. Engels, H. Helten, *Angew. Chem. Int. Ed.* **2025**, *64*, e202416088.

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