

Prof. Dr. A. Dieter Schlüter emeritus professor at ETH Zürich

- 1980 Received Diploma – LMU Munich
- 1980–1984 PhD – LMU Munich (Prof. G. Szeimies)
- 1984–1986 Post – doctoral studies in University of California in Berkley (Prof. K. P. Vollhardt) and University of Dunham (Prof. W. J. Feast)
- 1986–1991 Habilitation – MPI–P Mainz (Prof. G. Wegner)
- 1991–1992 Professor – TU Karlsruhe
- 1992–2004 Professor – FU Berlin
- 2004–2018 Professor – ETH Zürich

- > 295 publications
- *h*-index: 57

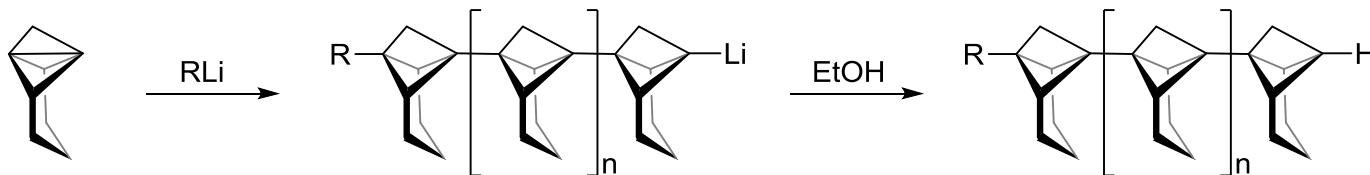
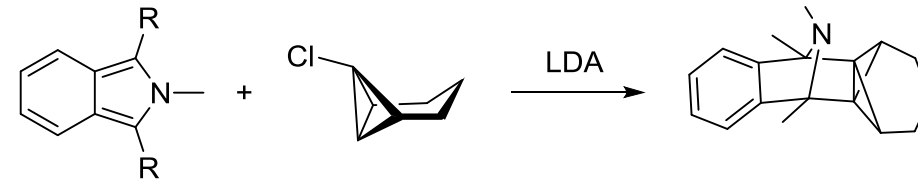


golden owl (best teacher et ETH)

- First publication: about the bonding situation in inverted carbon atoms

Chakrabarti, P.; Seiler, P.; Dunitz, J. D.; Schlüter, A. D.; Szeimies, G. *J. Am. Chem. Soc.* **1981**, *24*, 7378.

Zoch, H.-G.; Schlüter, A. D.; Szeimies, G. *Tetrahedron Lett.* **1981**, *39*, 3835.



R = ^tBu, Ph

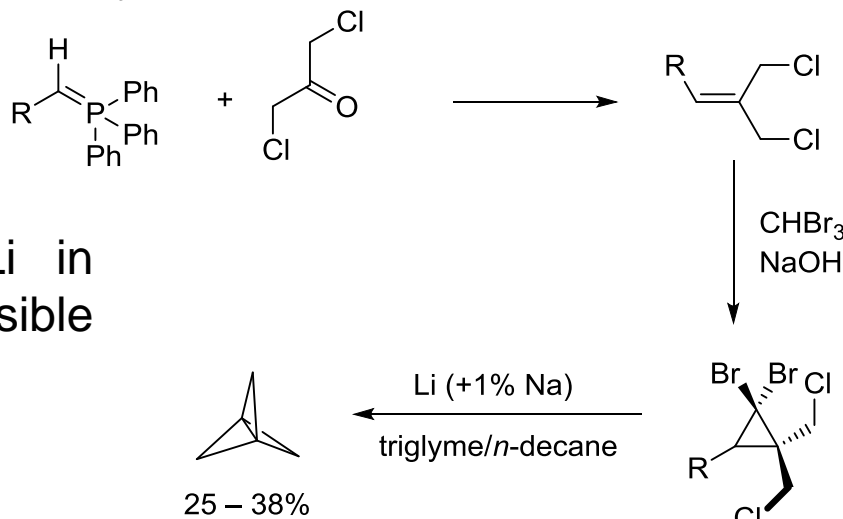
n = 11

Schlüter, A. D. *Macromolecules* **1988**, *5*, 1208.

Schlüter, A. D. *Angew. Chem. Int. Ed.* **1988**, *2*, 269.

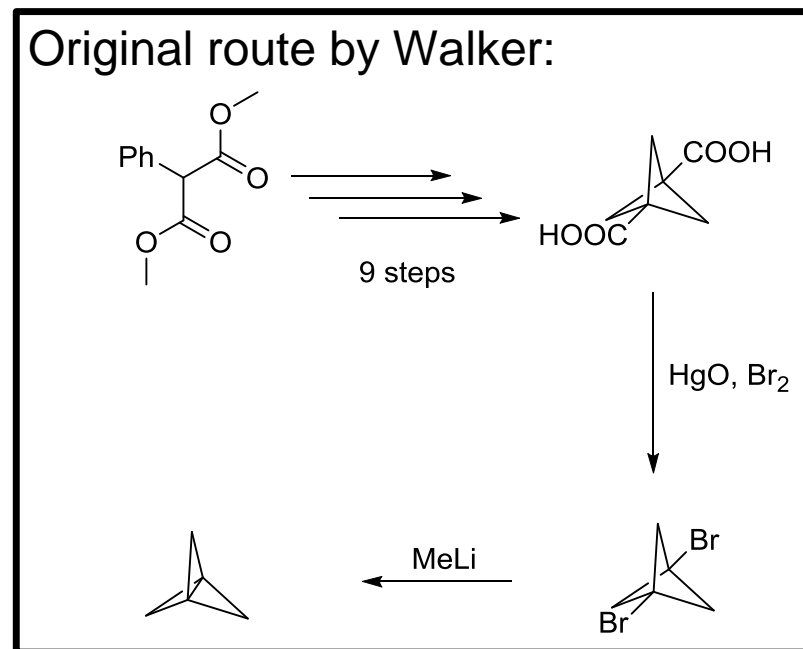
Wilberg, K. B.; Dailey, W. P.; Walker, F. H. Waddell, S. T.; Crocker, L. S.; Newton; M. *J. Am. Chem. Soc.* **1985**, *107*, 7247.

- Novel synthesis of propellanes by an optimized procedure published by Szeimies:



25 – 38%

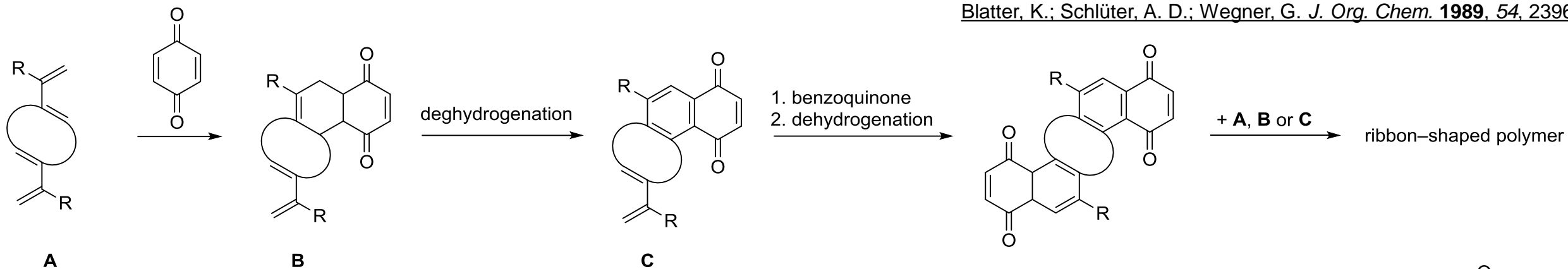
- Previous route with PhLi in ether/pentane → impossible isolation of propellane



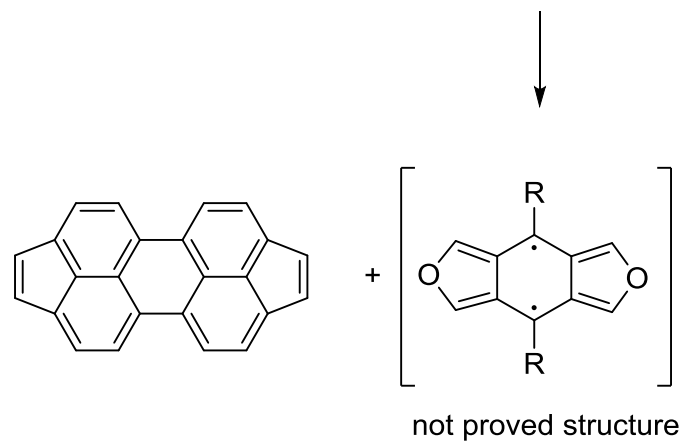
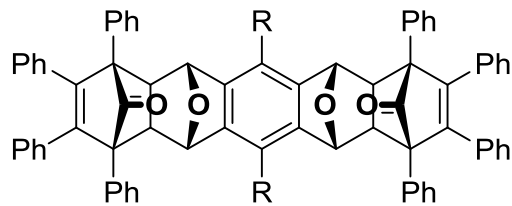
Belzner, J.; Bunz, U; Semmler, K.; Szeimies, G.; Opitz, K.; Schlüter, A. D. *Chem. Ber.* **1989**, *2*, 397.

Opitz, K.; Schlüter, A. D. *Angew. Chem. Int. Ed.* **1989**, *4*, 456.

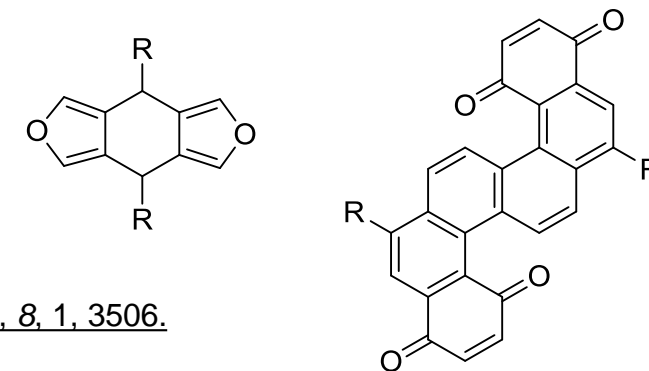
- Ribbon-shaped polymers *via* repetitive Diels–Alder reactions:



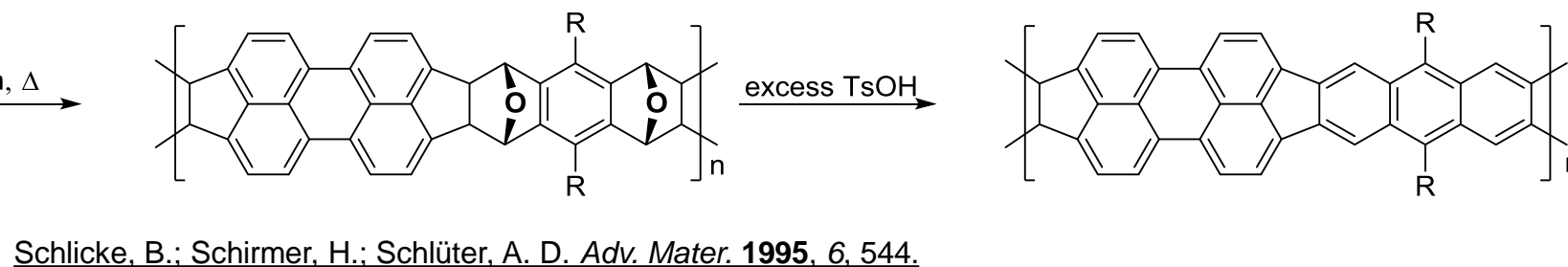
- “Pure” carbon scaffolds:



- Examples of building blocks for ribbon-shaped polymers:

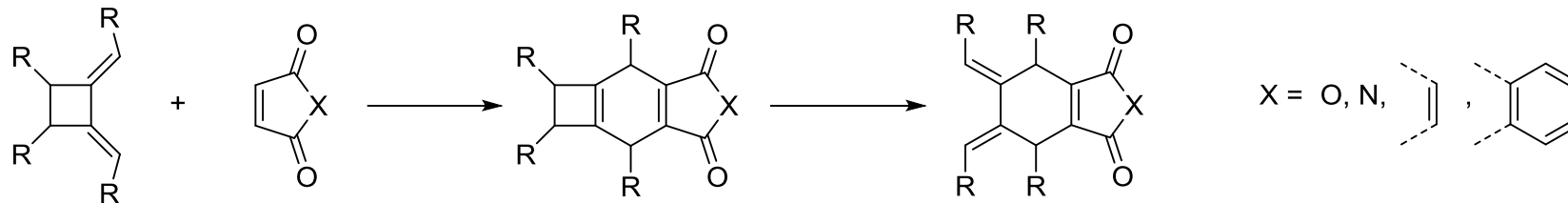


Blatter, K.; Schlüter, A. D. *Macromolecules* **1989**, *8*, 1, 3506.

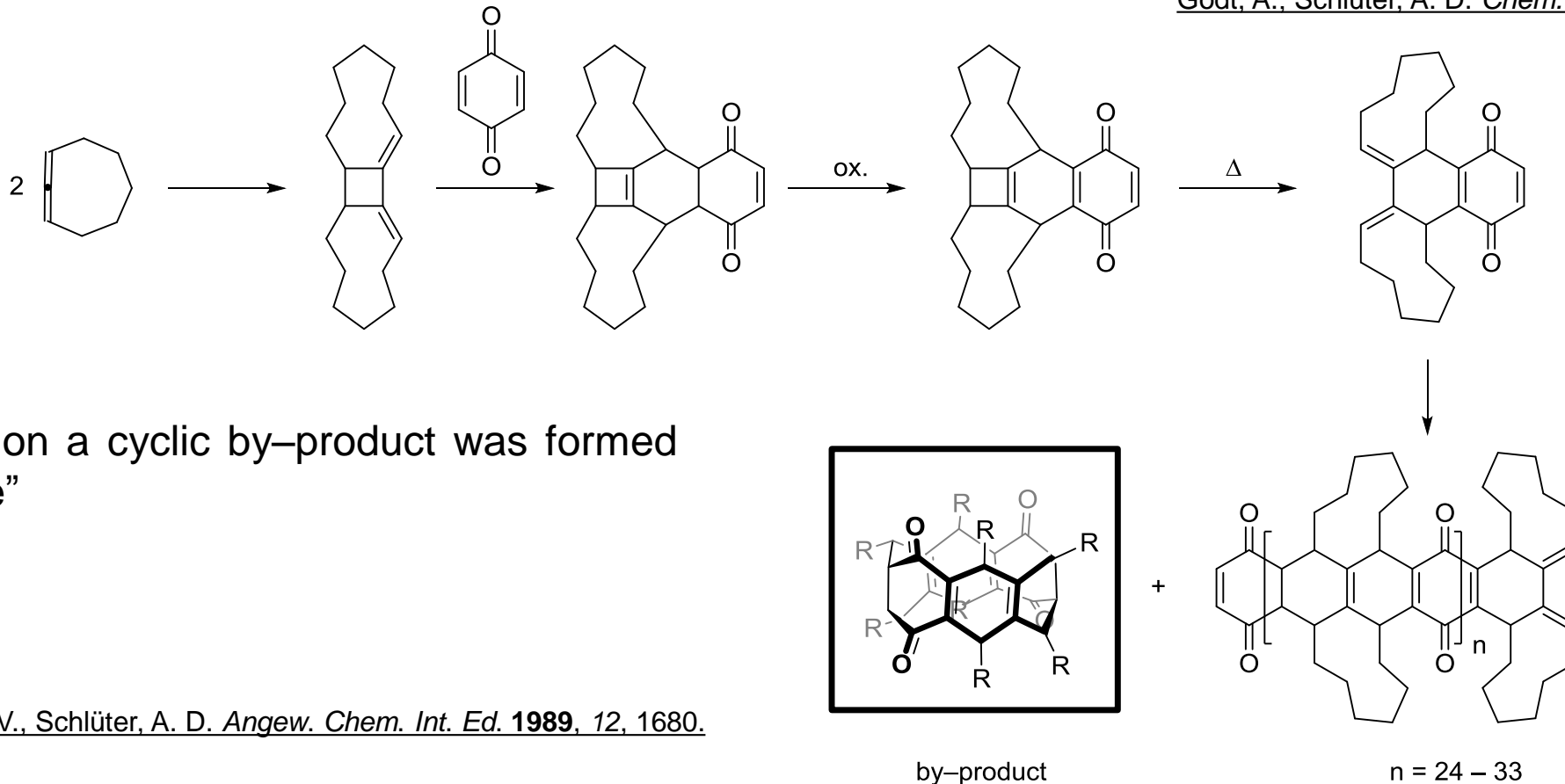


- Ribbon-shaped polymers by repetitive Diels-Alder reactions and cyclobutene ring opening:

• General idea:



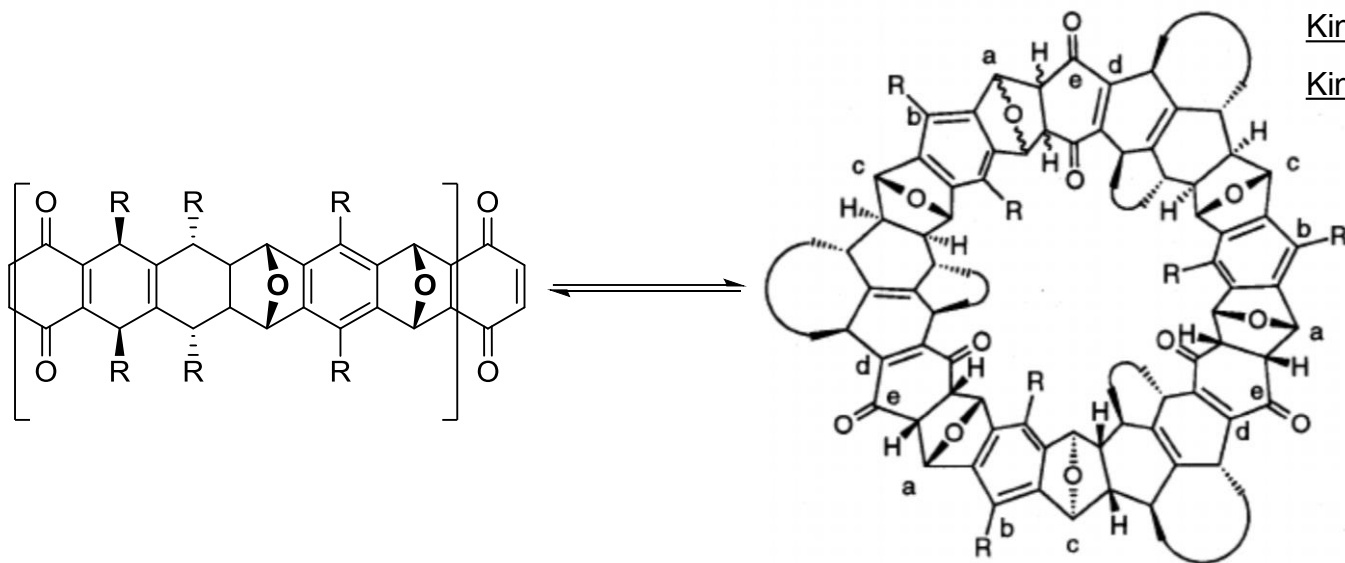
Godt, A.; Schlüter, A. D. *Chem. Ber.* **1991**, *1*, 149.



- In this reaction a cyclic by-product was formed → a “beltene”

Godt, A., Enkelmann, V., Schlüter, A. D. *Angew. Chem. Int. Ed.* **1989**, *12*, 1680.

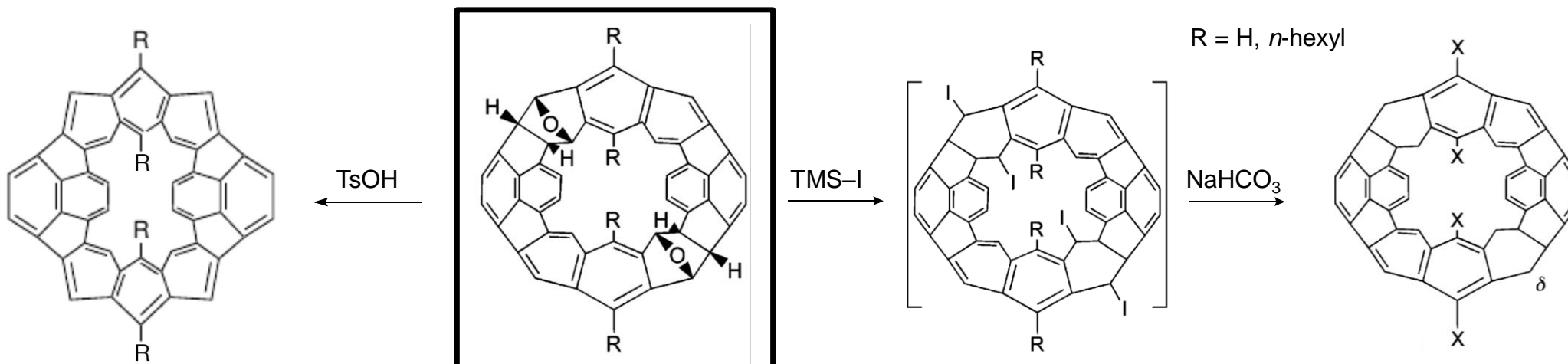
- Equilibrium between ribbon oligomer and beltene



Kintzel, O.; Luger, P.; Weber, M.; Schlüter, A. D. *Eur. J. Org. Chem.* **1998**, 1, 99.

Kintzel, O.; Schlüter, A. D. *Acta Polym.* **1997**, 5-6, 212.

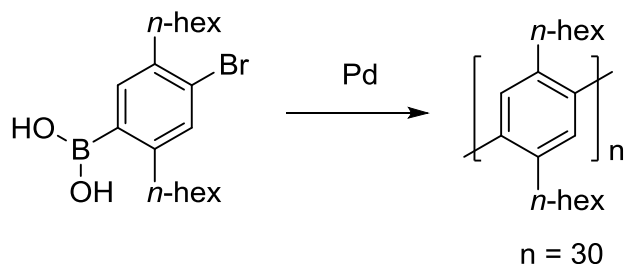
- Upon heating: oligomer is converted into beltene with 45% yield
- Removal oxygens \rightarrow pure carbon scaffold:
 - Addition of TMS-I and work-up with aq. NaHCO_3



Standera, M.; Häfliger, R.; Gershoni-Poranne, R.; Stanger, A.; Jeschke, G.; van Beek, J. D. Bertrsch, L.; Schlüter, A. D. *Chem. Eur. J.* **2011**, 17, 12163.

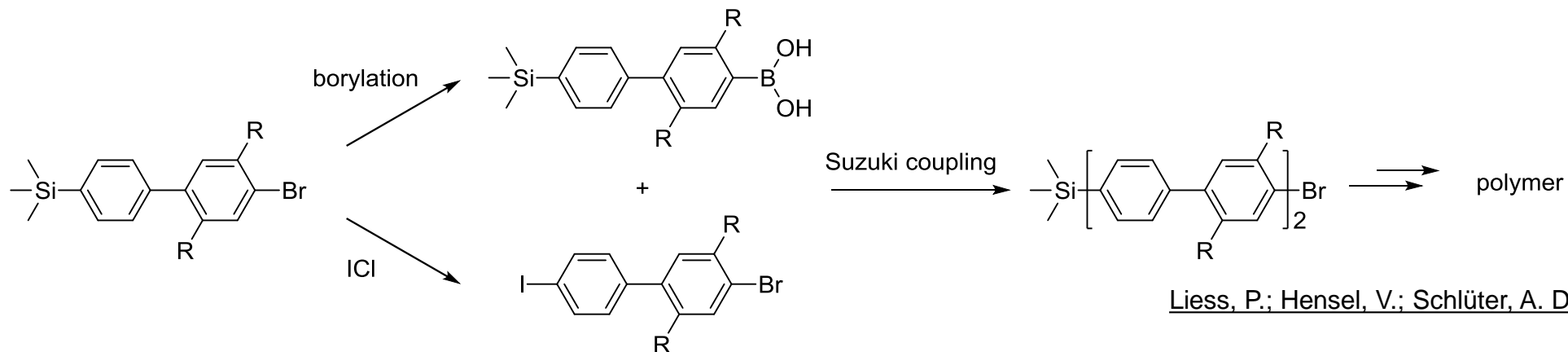
Stuparu, M.; Gramlich, V.; Stanger, A.; Schlüter, A. D. *J. Org. Chem.* **2007**, 72, 424.

- Highest reported DP (until 1989) in Suzuki cross-couplings



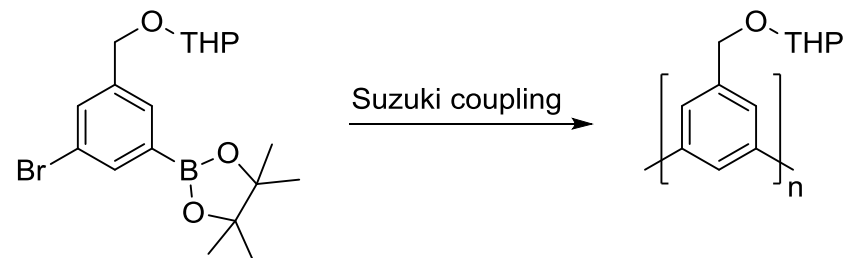
Rehahn, M.; Schlüter, A. D.; Wegner, G.; Feast, W. J. *Polymer* **1989**, *6*, 1060.

- Building-up polymers:



Liess, P.; Hensel, V.; Schlüter, A. D. *Liebigs Ann.* **1996**, *7*, 1037.

- Poly(*m*-phenylenes)

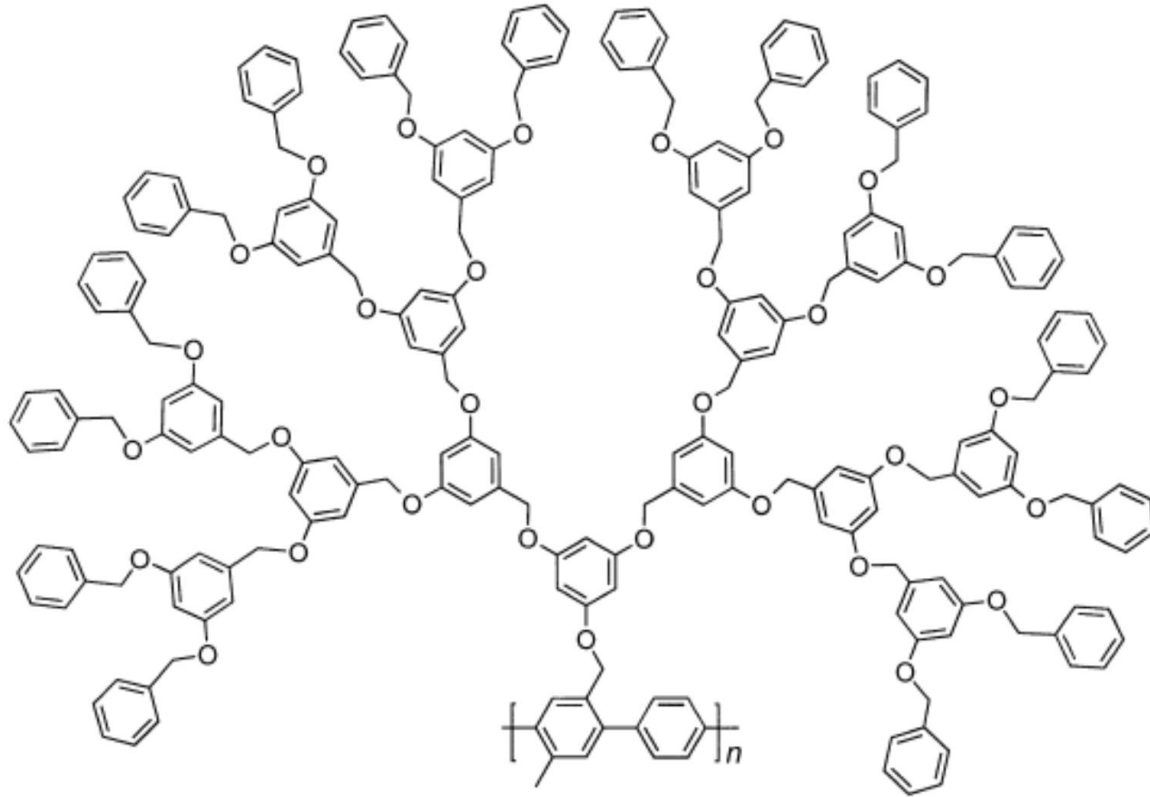


→ Cyclic by-products with various ring sizes ($n = 6-25$)

Hohl, B.; Bertschi, L.; Zhang, X.; Schlüter, A. D.; Sakamoto, J.; *Macromolecules* **2012**, *45*, 5418.

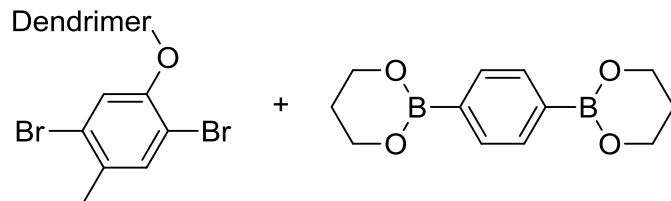
- Of course a variety of other polymers were studied and reported

- Combination of linear polymers and Fréchet dendrimers



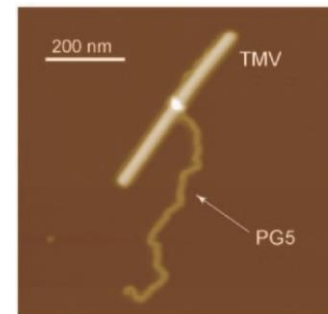
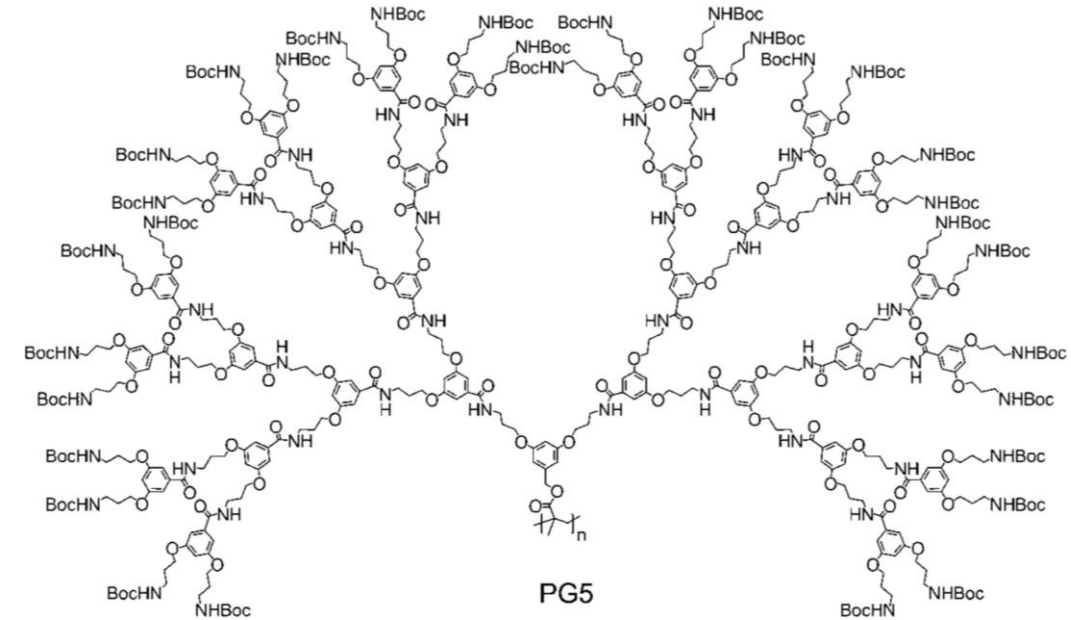
Bo, Z.; Schlüter, A. D. *Chem. Eur. J.* **2000**, *17*, 3235.

via:



Yu, H.; Schlüter, A. D.; Zhang, B.; *Macromolecules* **2012**, *45*, 855.

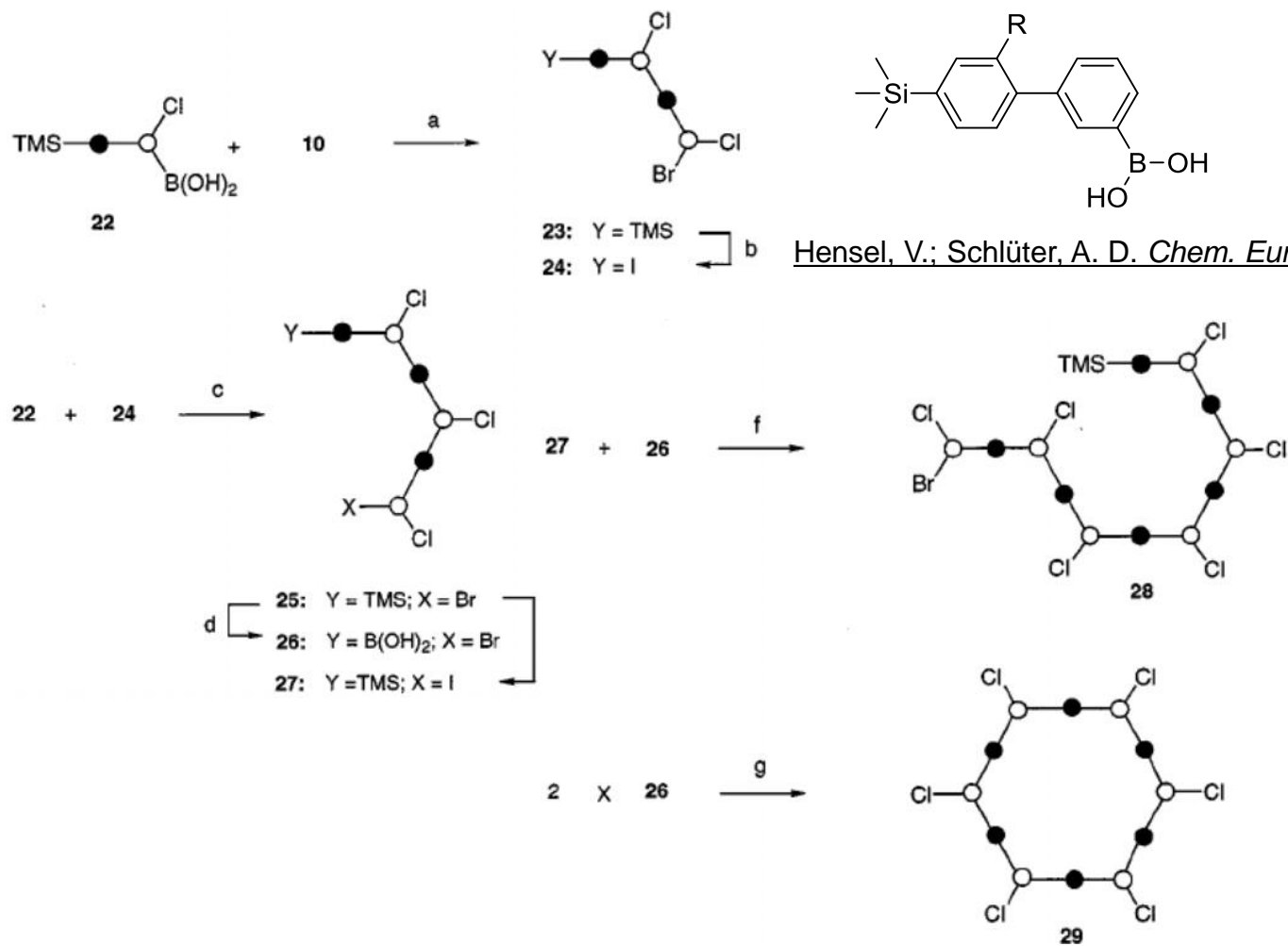
“The Largest Synthetic Structure with Molecular Precision: Towards a Molecular Object”



- As big as a biological structure – the rod-like tobacco mosaic virus (TMV)

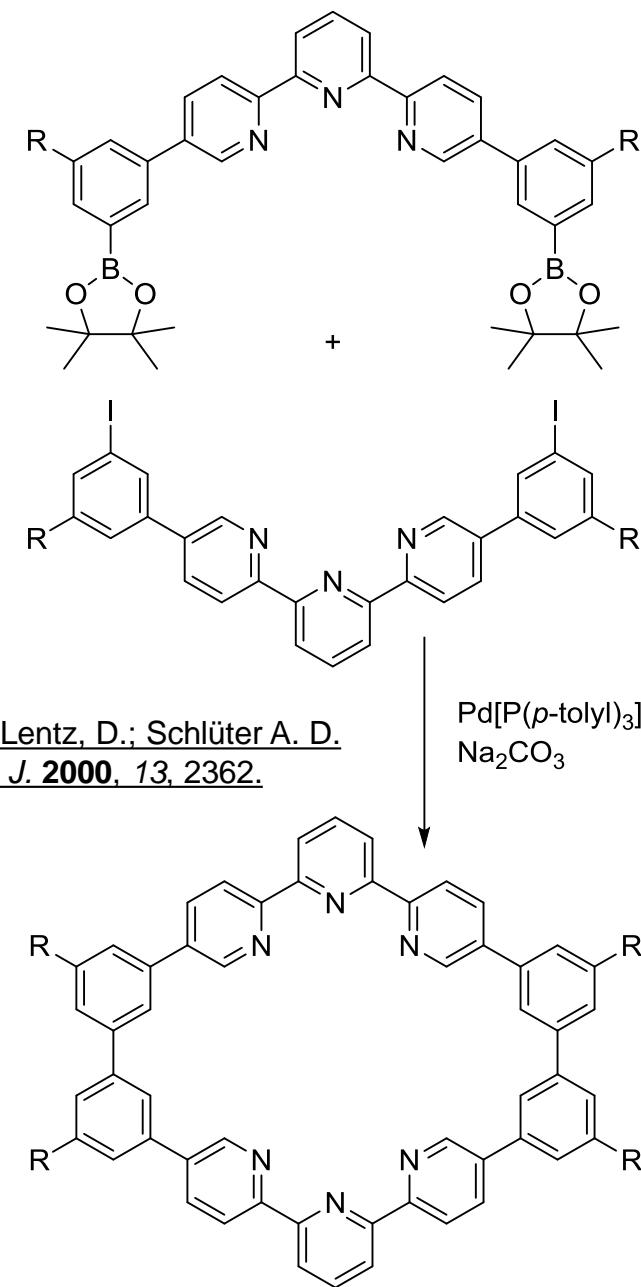
Zhang, B.; Wepf, R.; Fischer, K.; Schmidt, M.; Besse, S.; Lindner, P.; King, B. T.; Sigel, R.; Schurtenberger, P.; Talmon, Y.; Ding, Y.; Krüger, M.; Halperin, A.; Schlüter, A. D. *Angew. Chem. Int. Ed.* **2011**, *50*, 737.

- General strategies for building-up macrocycles:



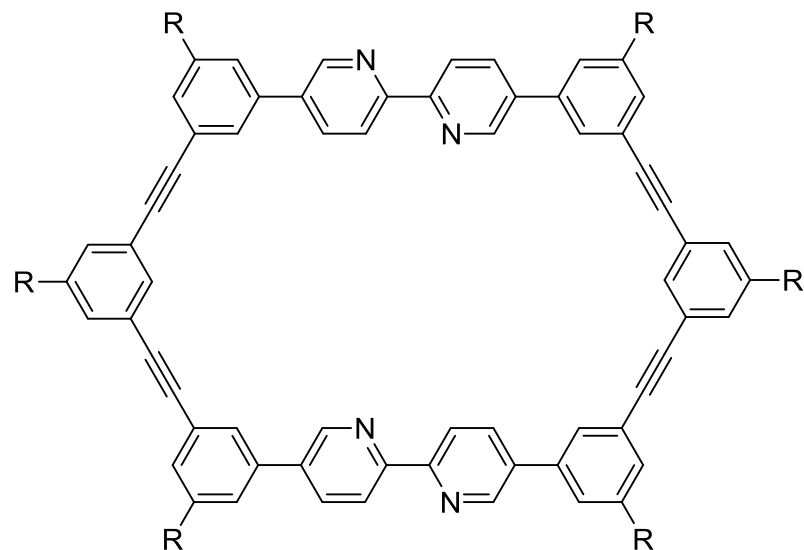
Hensel, V.; Schlüter, A. D. *Chem. Eur. J.* **1999**, *2*, 421.

Hensel, V.; Schlüter, A.D. *Eur. J. Org. Chem.* **1999**, *2*, 451.

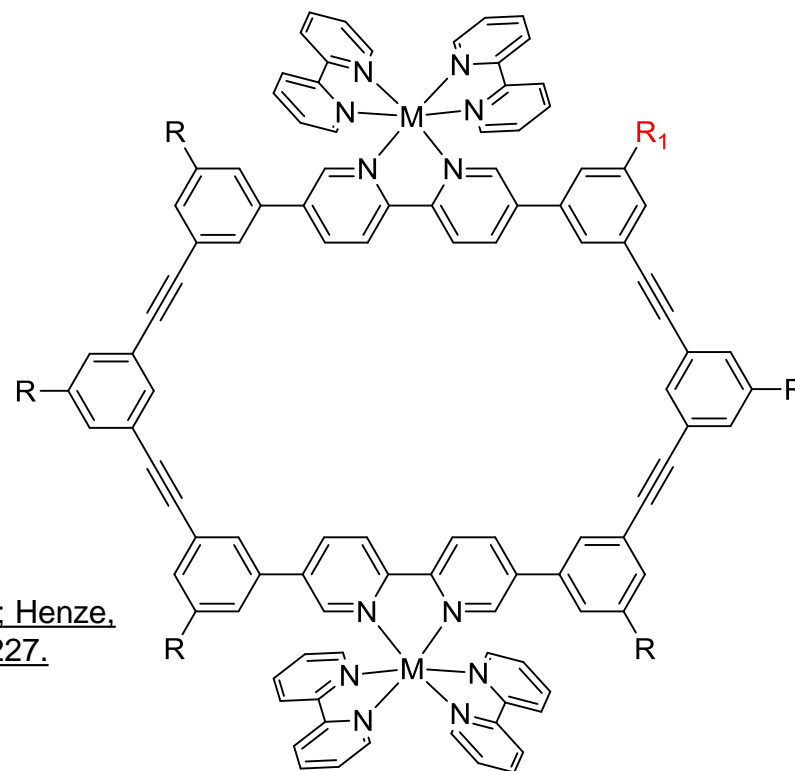
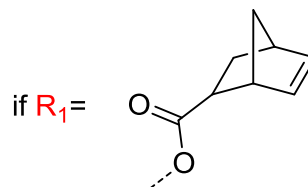


Henze, O.; Lentz, D.; Schlüter A. D. *Chem. Eur. J.* **2000**, *13*, 2362.

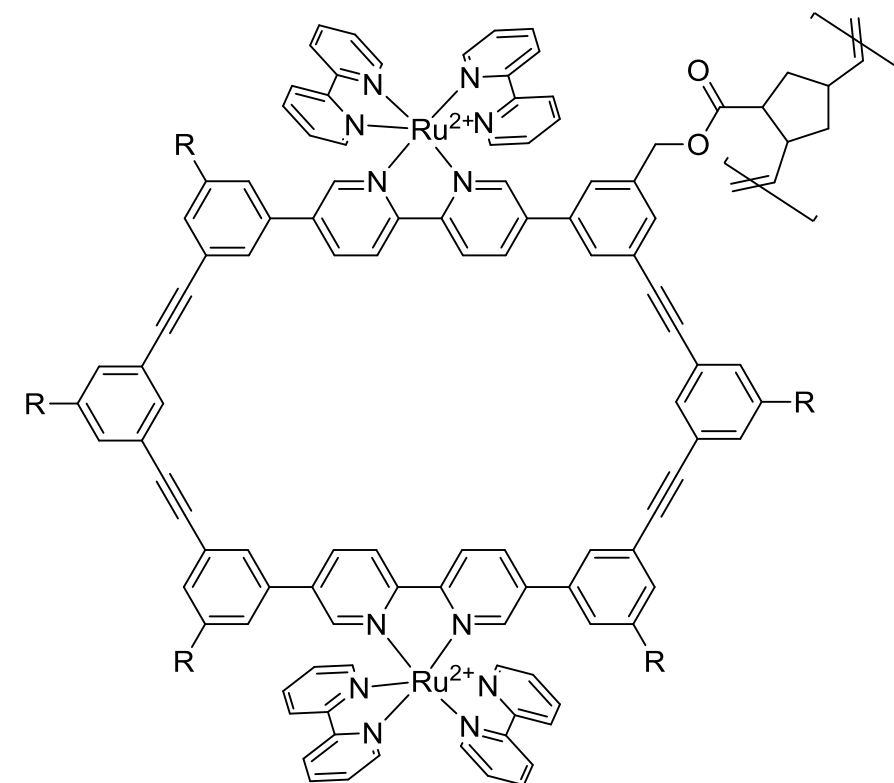
- Different coupling methods and incorporation of metal centers



Lehmann, U.; Schlüter, A. D. *Eur. J. Org. Chem.* **2000**, *20*, 3483.



Venturi, M.; Marchioni, F.; Balzani, V.; Opris, D. M.; Henze, O.; Schlüter, A. D. *Eur. J. Org. Chem.* **2003**, *21*, 4227.

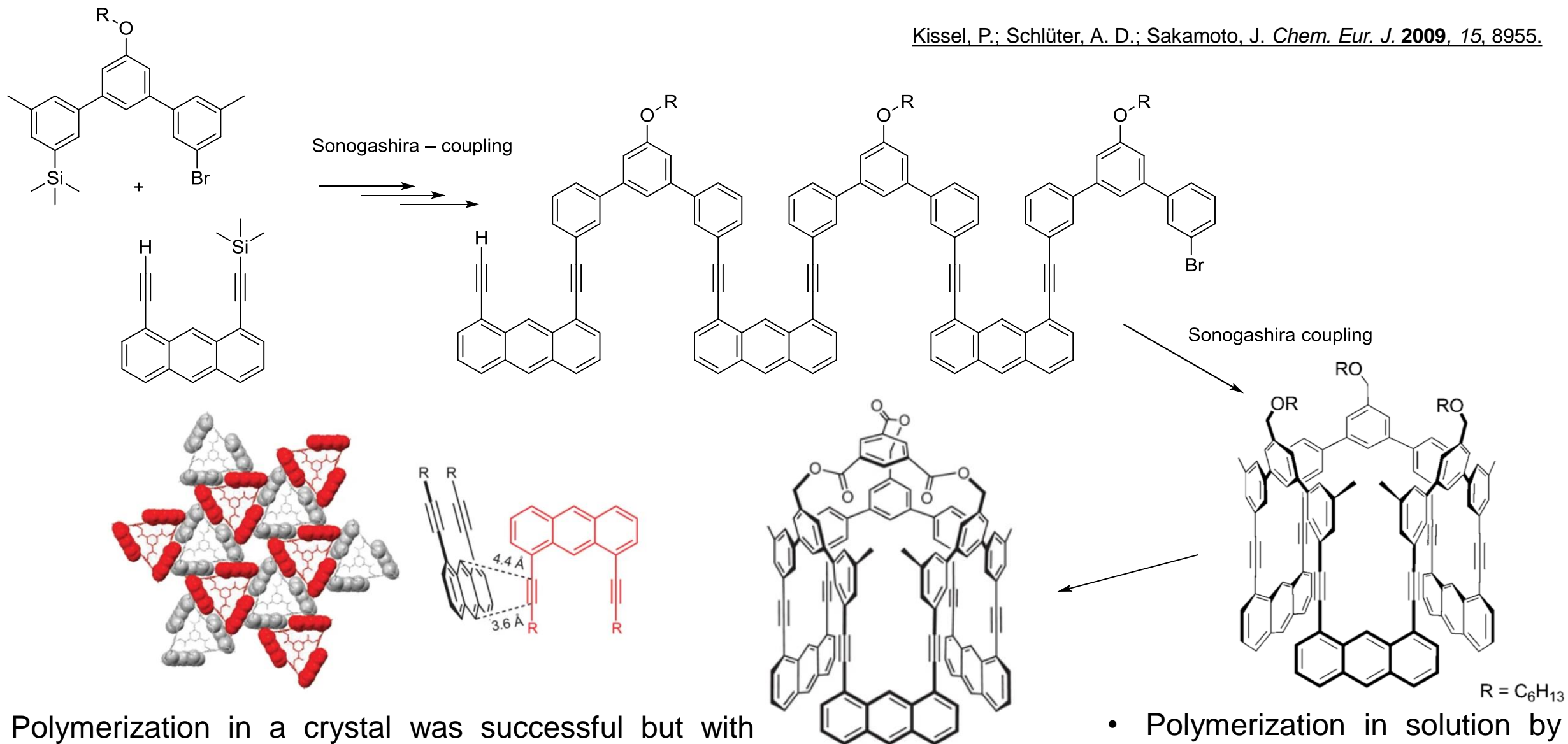


Opris, D. M.; Franke, P.; Schlüter, A. D. *Eur. J. Org. Chem.* **2005**, *5*, 822.

- Interesting review on different kinds of shape-persistent macrocycles:

Grave, C.; Schlüter, A. D. *Eur. J. Org. Chem.* **2002**, *18*, 3075.

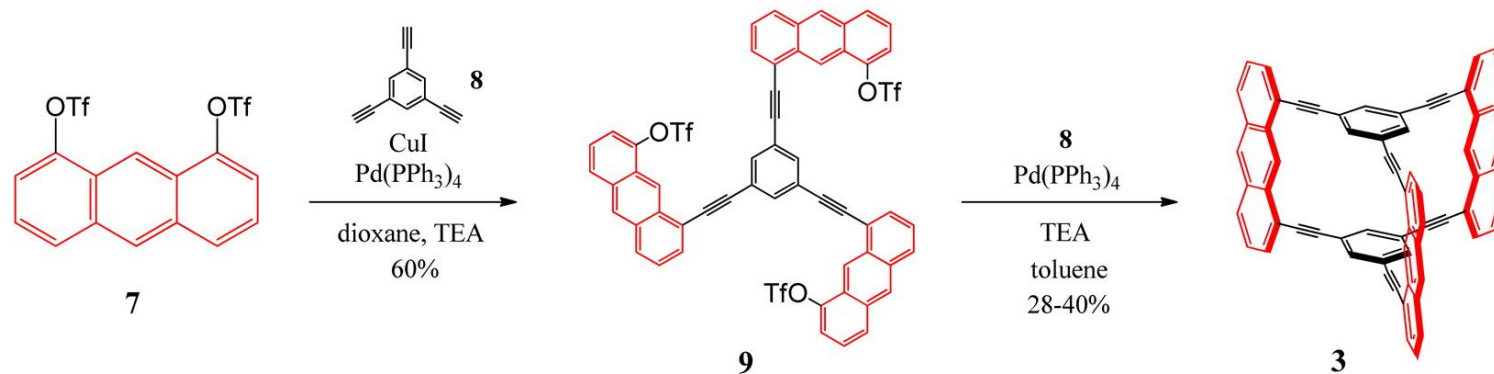
Kissel, P.; Schlüter, A. D.; Sakamoto, J. *Chem. Eur. J.* **2009**, *15*, 8955.



- Polymerization in a crystal was successful but with anthracene and acetylene

- Polymerization in solution by anthracene dimerization failed

- Further attempts of 2D polymers by anthracene dimerization



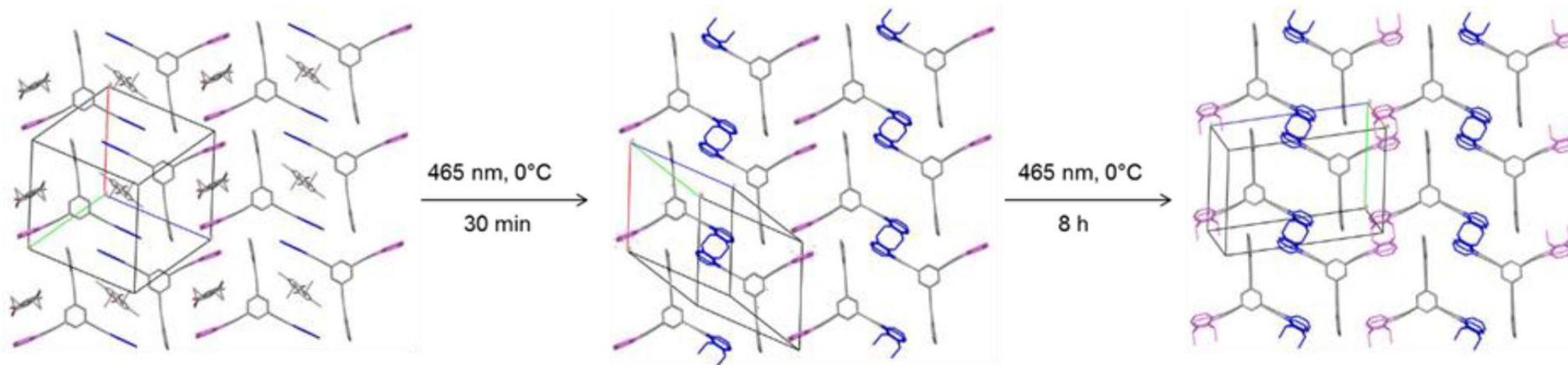
Servalli, M.; Trapp, N.; Wörle, M.; Klärner, F. G. *J. Org. Chem.* **2016**, *6*, 2572.

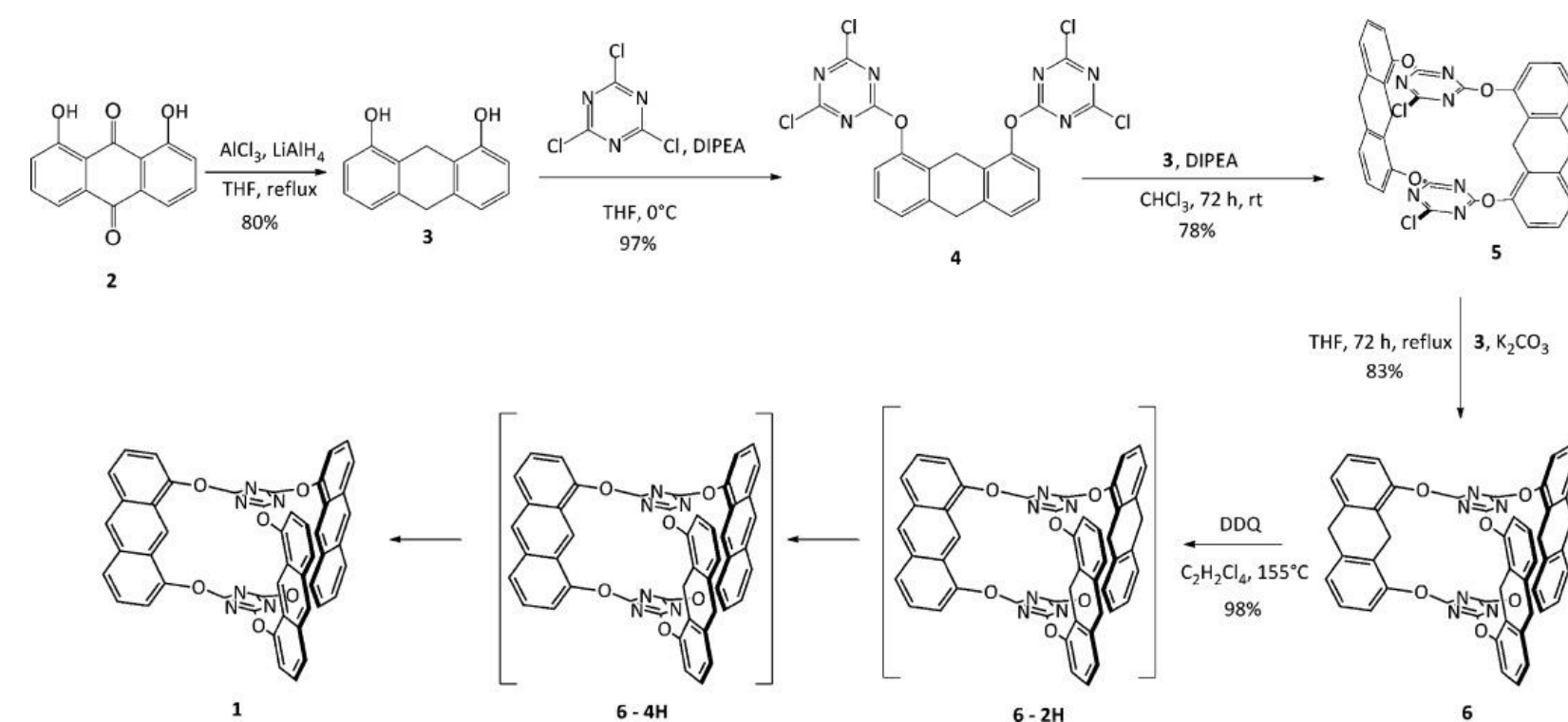
- Studied the packing of this molecule in 30 different solvents and classified the results

Servalli, M.; Solar, M.; Trapp, N.; Wörle, M.; Schlüter A. D. *Cryst. Growth Des.* **2017**, *17*, 6510.

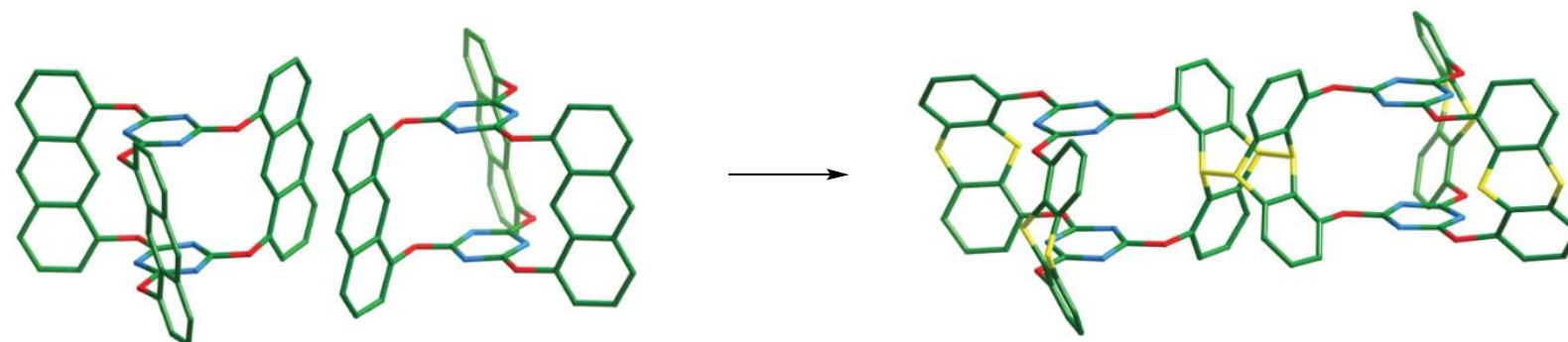
Servalli, M.; Trapp, N.; Solar, M.; Wörle, M.; Schlüter A. D. *Cryst. Growth Des.* **2017**, *17*, 3419.

- Yielded in 1D polymers





Kory, M. J.; Bergeler, M.; Reiher, M.; Schlüter, A. D. *Chem. Eur. J.* **2014**, *20*, 6934.



Kory, M. J.; Wörle, M.; Weber, T.; Payamyar, P.; van de Poll, S. W.; Dshemuchadse, J.; Trapp, N.; Schlüter, A. D. *Nat. Chem.* **2014**, *6*, 779.

