

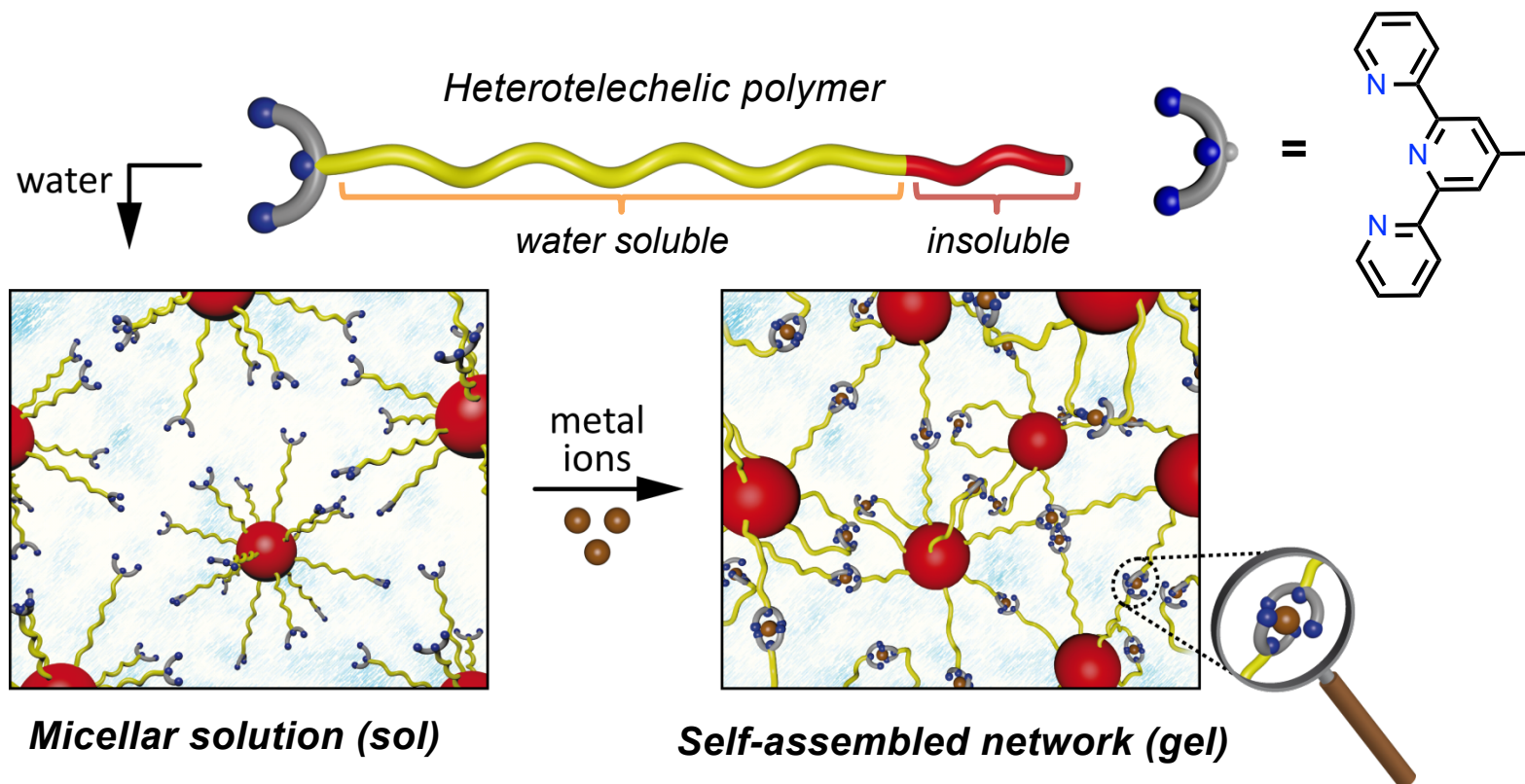
DoDyNet kick-off meeting

WP1- Synthesis

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Université catholique de Louvain
Belgium

Hierarchical assembly of block copolymers into supramolecular gels



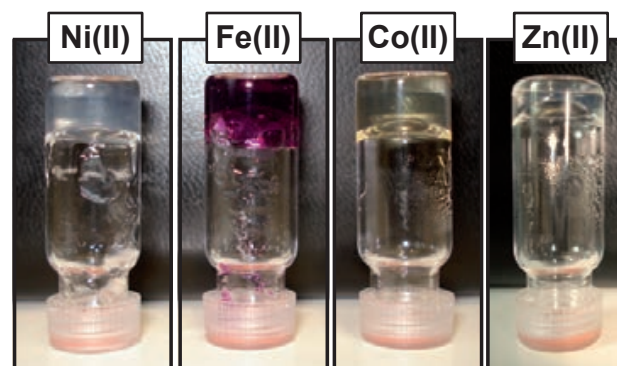
Macromolecules **2013**, 46, 9134

Macromolecules **2014**, 47, 4514

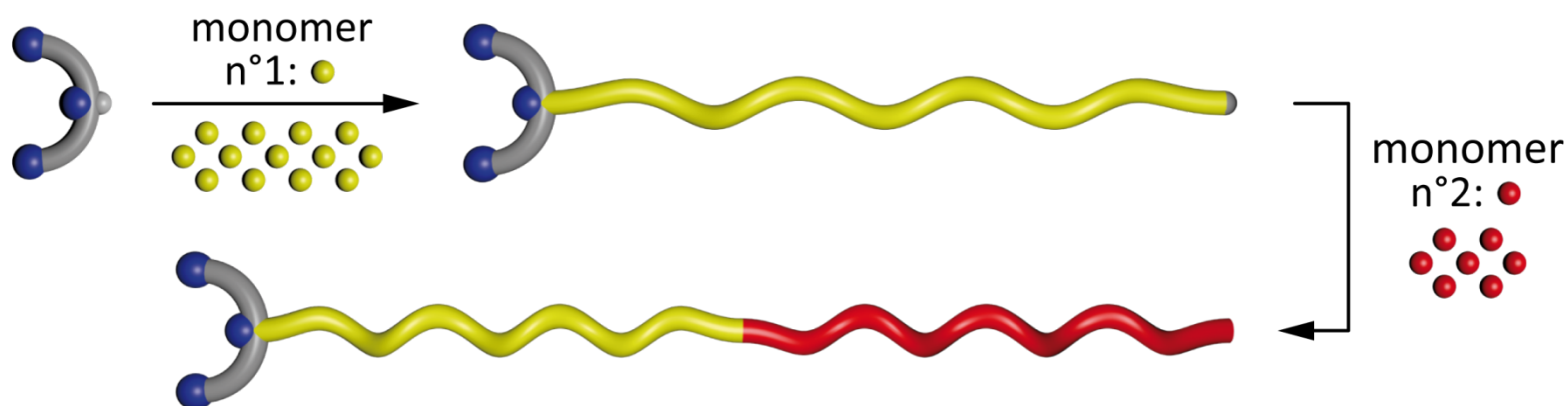
Soft Matter **2014**, 10, 3086

ACS Macro Lett. **2016**, 55, 1364

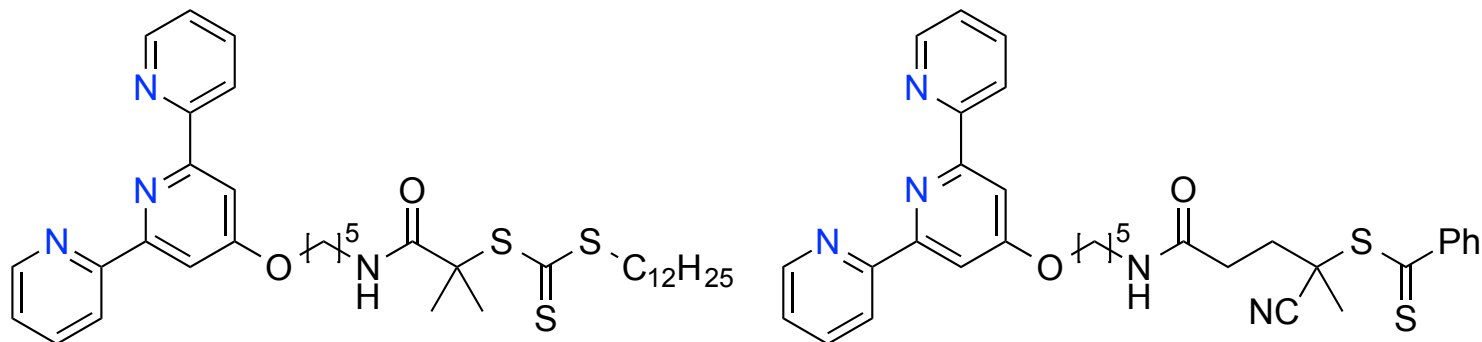
Polym. Chem. **2017**, 8, 1527



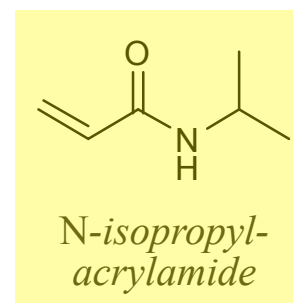
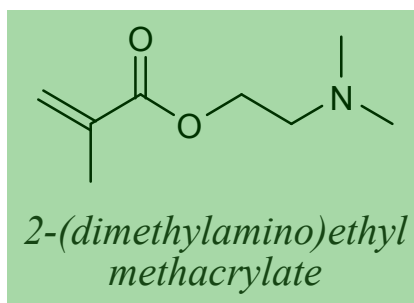
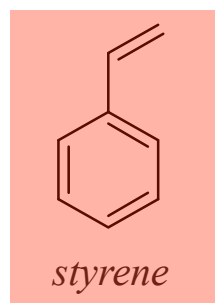
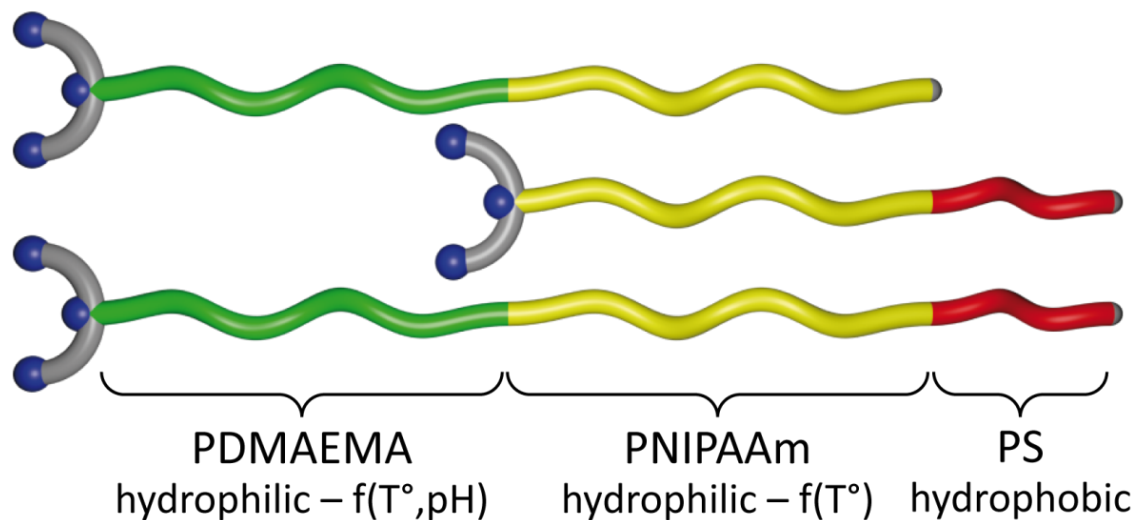
Synthesis of macro-building blocks via sequential RAFT polymerization



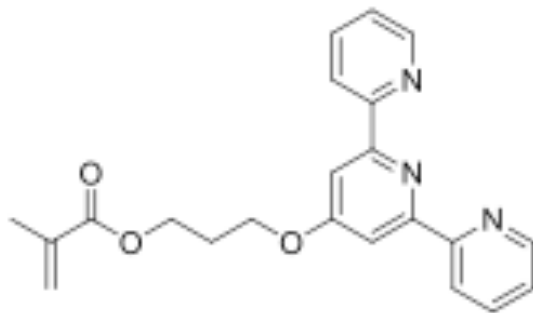
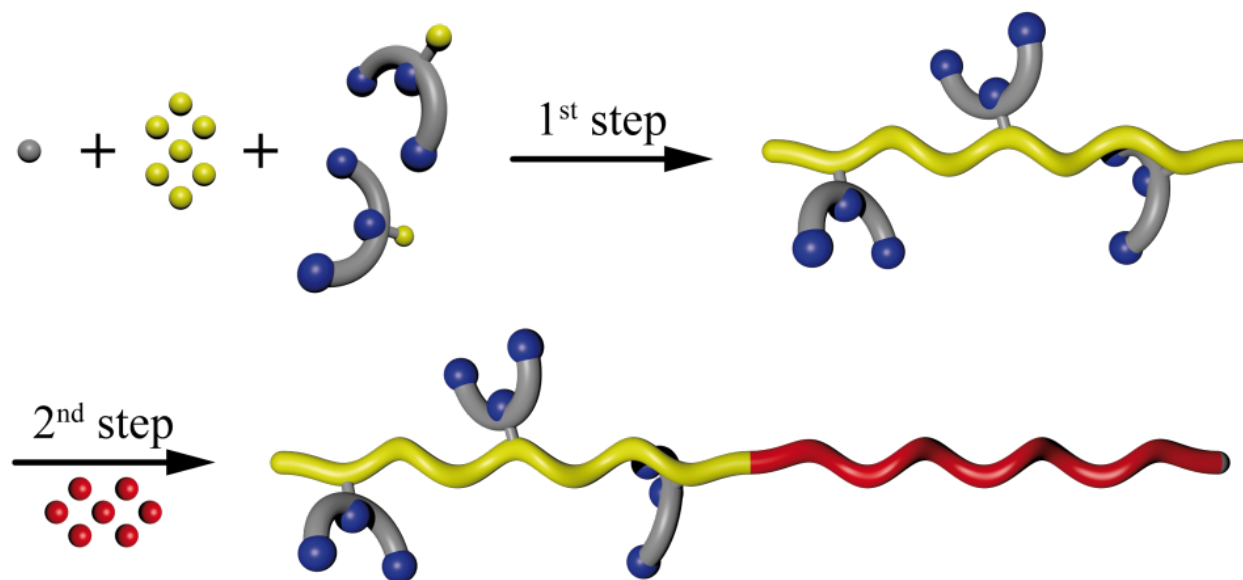
Ligand-modified control agents



Library of macromolecular building blocks

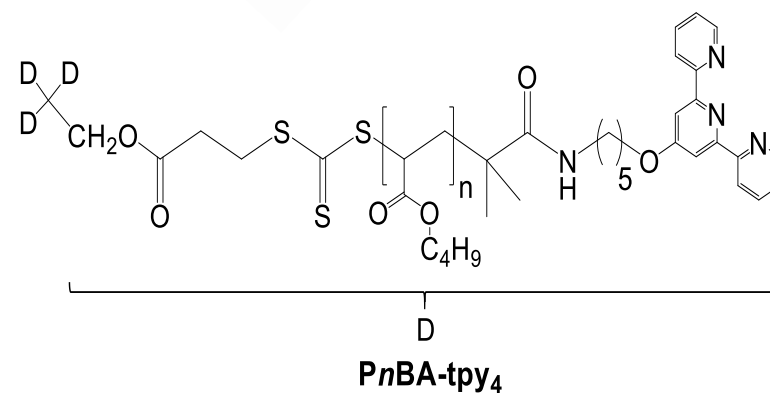
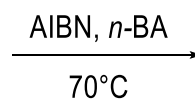
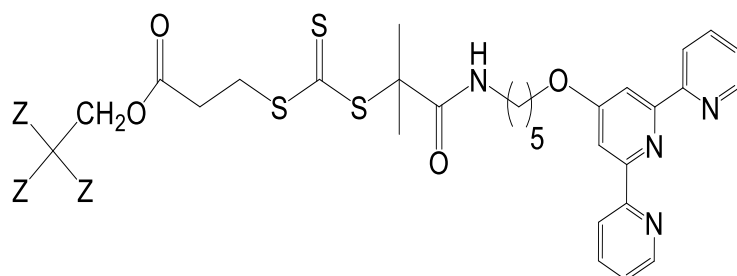
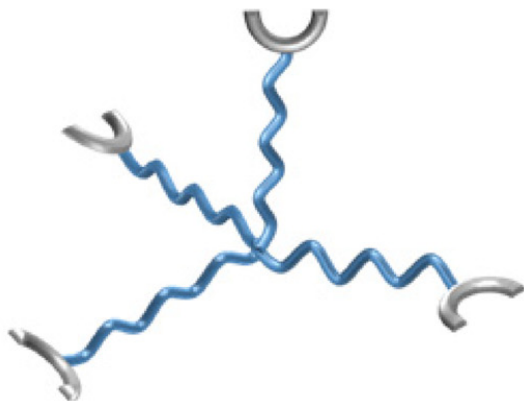


Side chains functionalized polymers



Acrylate, methacrylate, or acrylamide
Length of side chain can be tuned

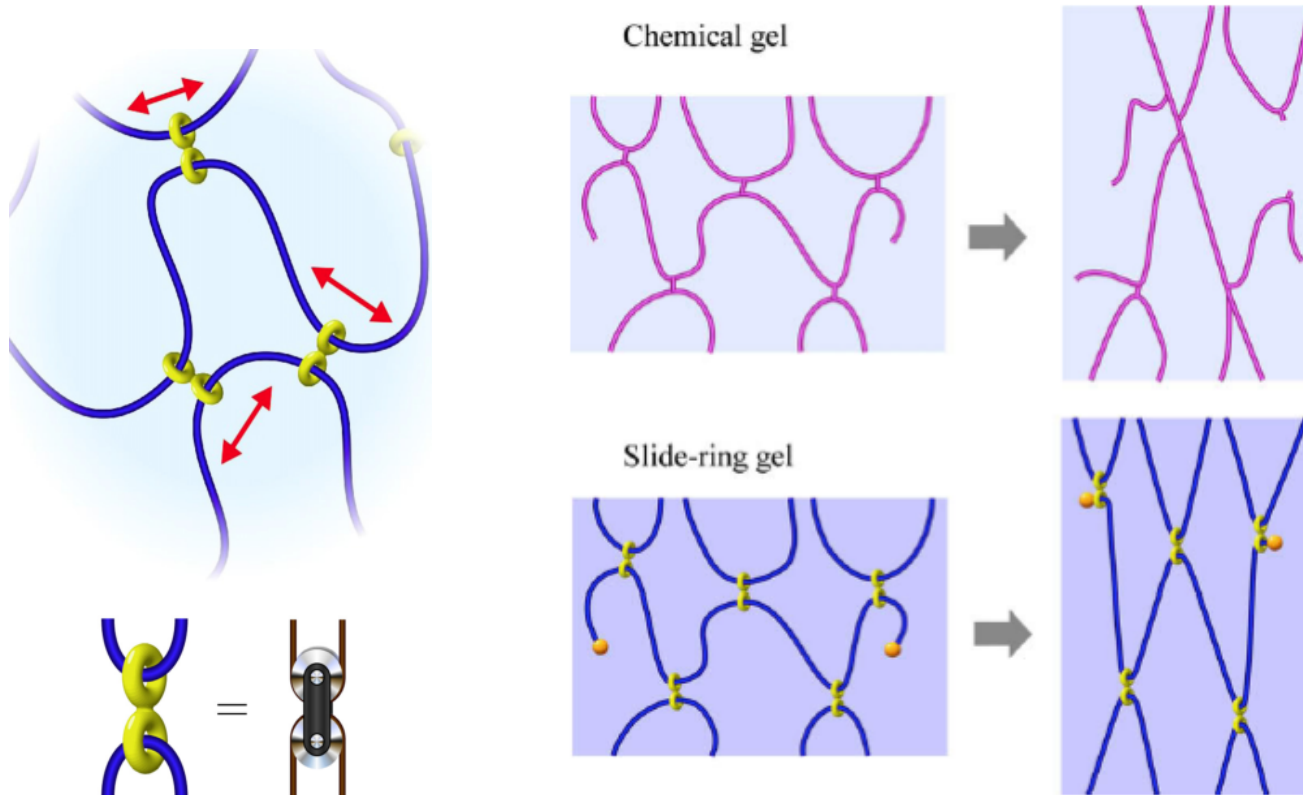
Telechelic linear and star polymers

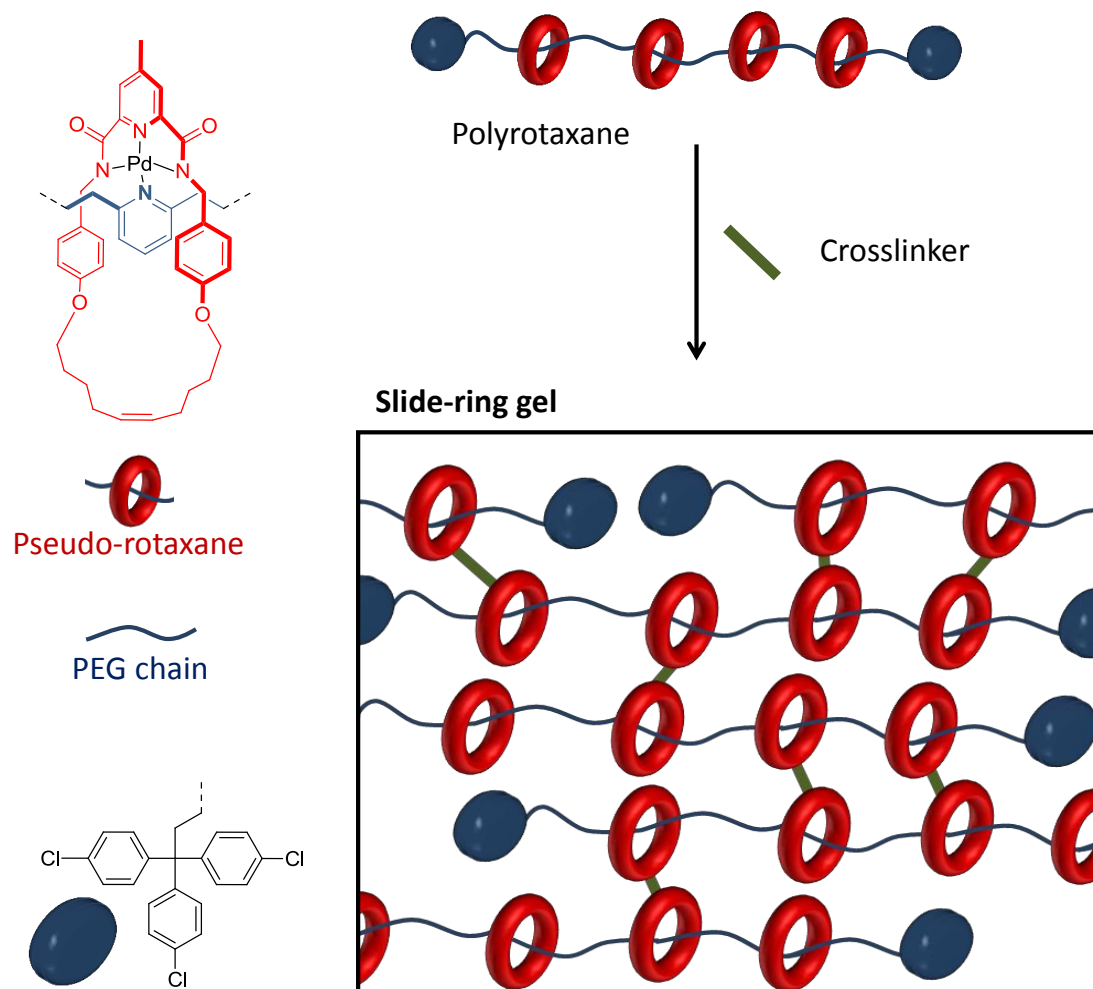


Macromolecules **2017**, 50, 5175

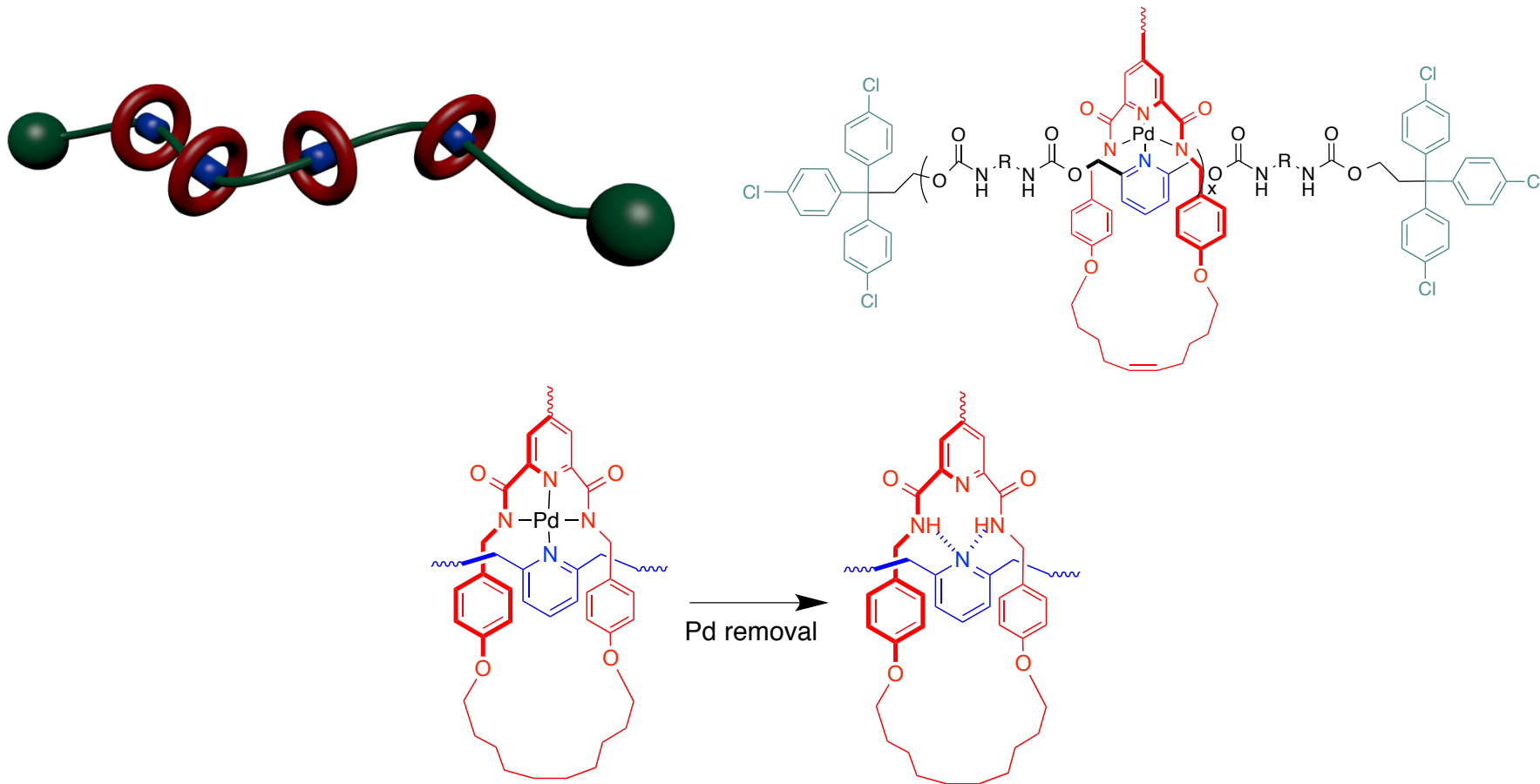
J. Rheol. **2017**, 61, 1245

- ➡ Gels based on freely movable (mechanical) crosslinks
- ➡ Equilibration of tensions along the chains (pulley effect)





Synthesis of polyrotaxane based on polyaddition between PEG and di-isocyanate



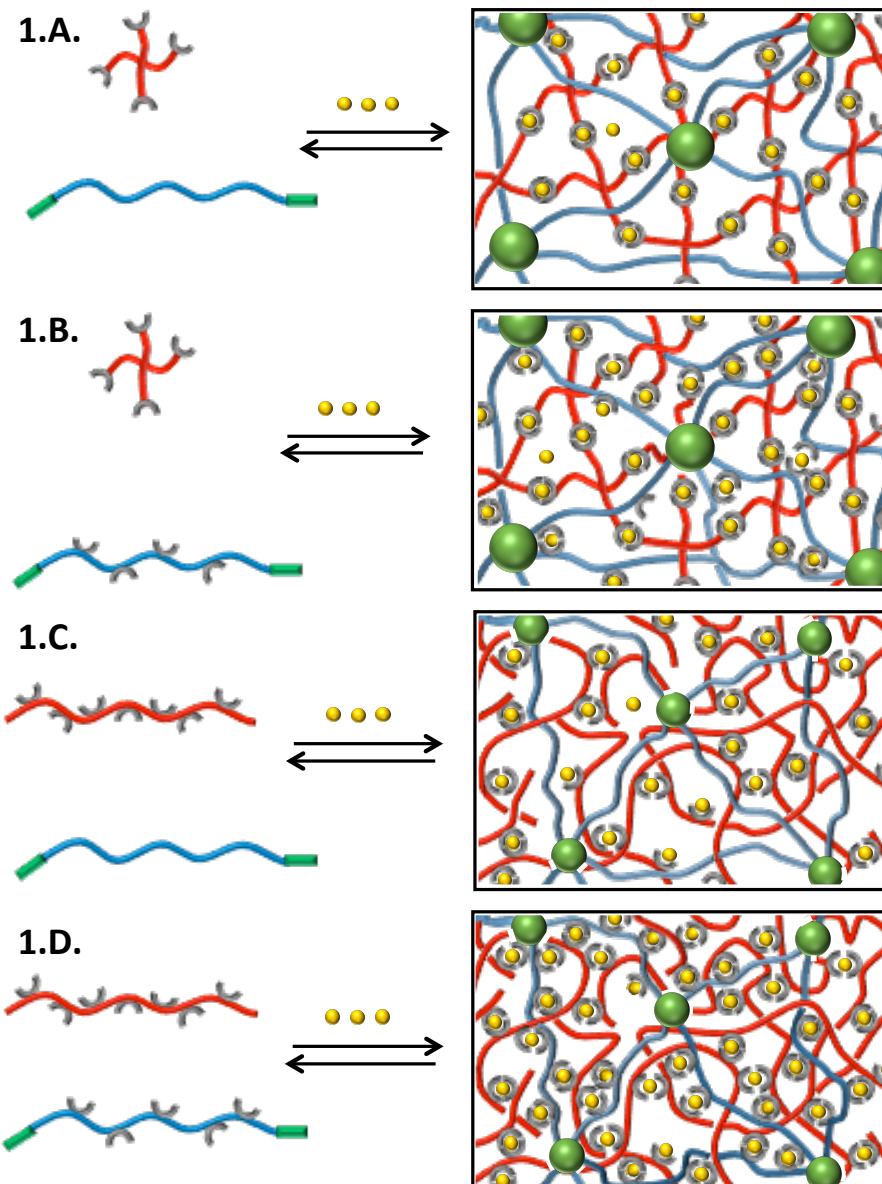
Removal of Pd ion unlocks the ring and allows its motion along the polymer chain

Main tasks:

- Synthesis of the different building blocks
- DDN preparation
- Linear rheology

Two main systems:

- DNN based on metal-ligand, phase separation and entanglements
- DDN based on slide-ring gels





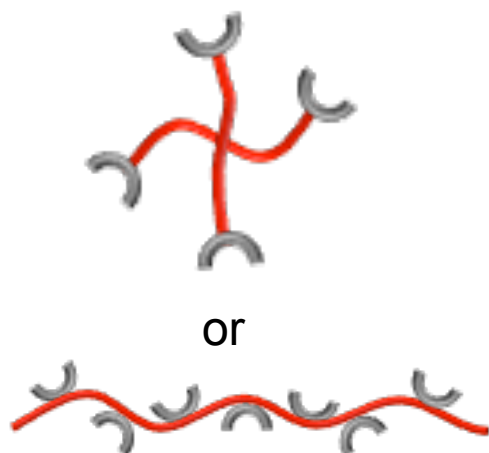
- Commercially available PEO stars
- Made by RAFT: acrylate or acrylamide based



- Commercially available: PS-PnBA-PS, PS-PAA-PS, PS-PMMA-PS
- Made by RAFT: acrylate or acrylamide based
- Made by ROP from PEO macroinitiator: PCL-PEO-PCL

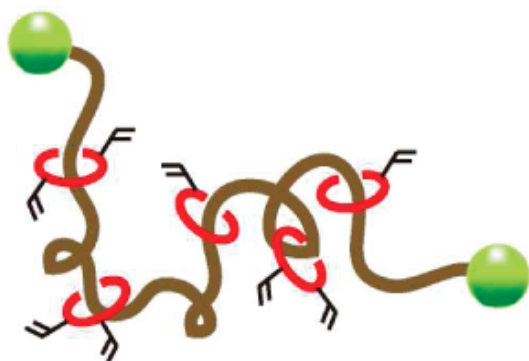


Made by RAFT with functionalized co-monomer



First highly crosslinked network

Sacrificial reversible network based on
metal-ligand interactions



Second sparsely crosslinked network

Permanent network with high stretchability

Based on Ito's work: *Nature Commun.* **2014**, 6124