Functionalized Poly(2-oxazoline)s for Surface Coating

Laurenz Elfeld[1], Laura Mengs[1], Rainer Jordan[1]*

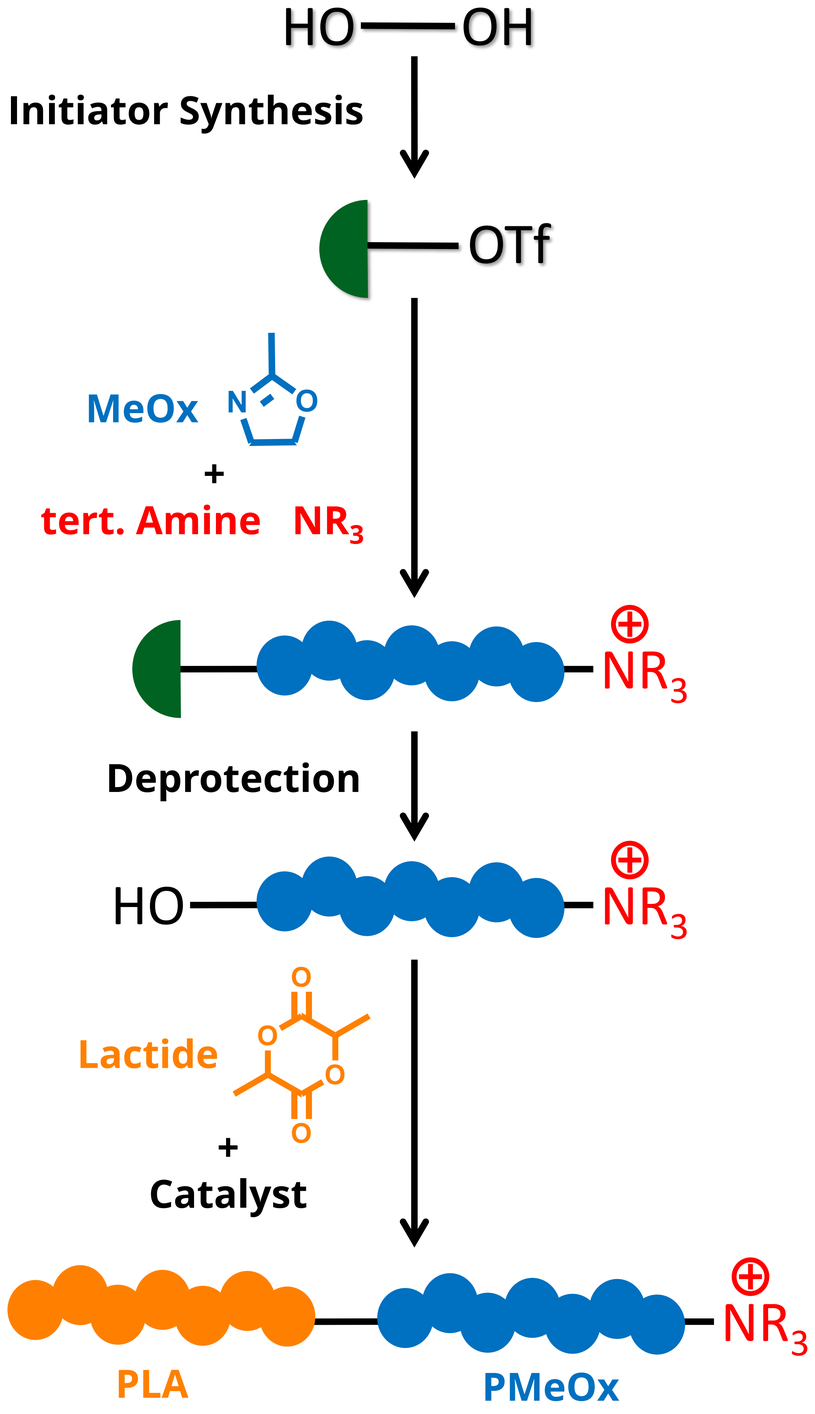
Department of Chemistry and Food Cemistry
Chair of Macromolecular Chemistry

[1] *Chair of Macromolecular Chemistry, Technische Universität Dresden*
* rainer.jordan@tu-dresden.de

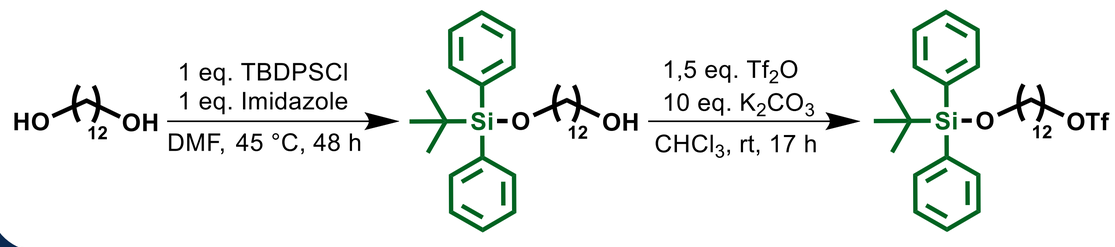
Motivation

In light of the COVID-19 crisis, antibacterial surfaces have gained relevance due to their application potential for medical devices.[1] A promising strategy is the coating of a surface with polymers due to their antifouling behavior[2] as well as antimicrobial properties by introducing a cationic functionality.[3] The combination of these antibacterial effects can be achieved by coating with Poly(2-oxazoline)s (POx) that are functionalized with a quarternary ammonium group.[4,5] One target for these antibacterial surfaces is Polylactide (PLA), which is used in surgical devices.[6] For the coating of such materials, besides pure POx materials[7], copolymers of PLA with POx can be beneficial.

Reaction Scheme

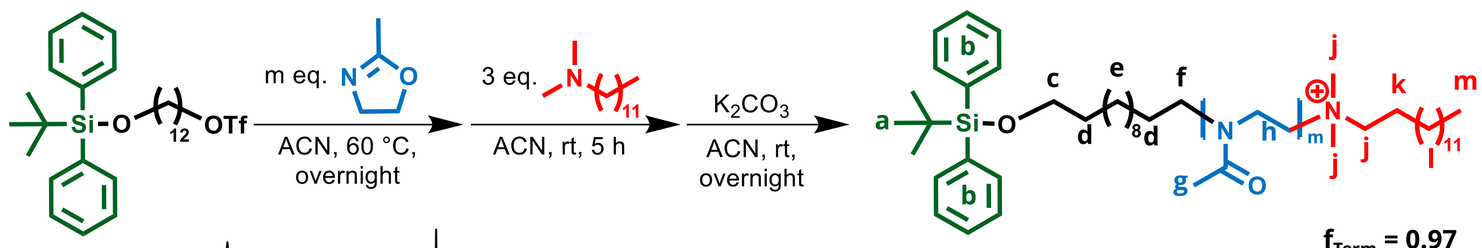


Initiator Synthesis

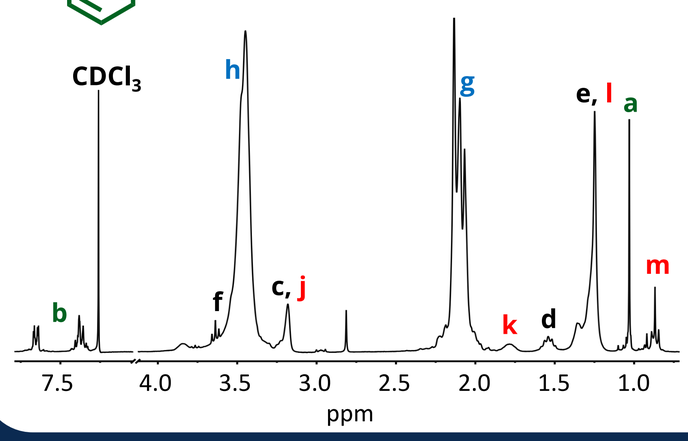


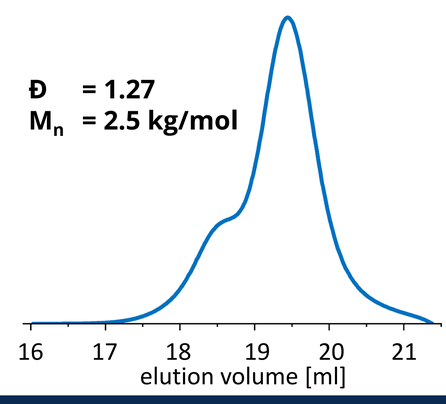
Immediate usage or formation of initiator salt ✓

Polymerization



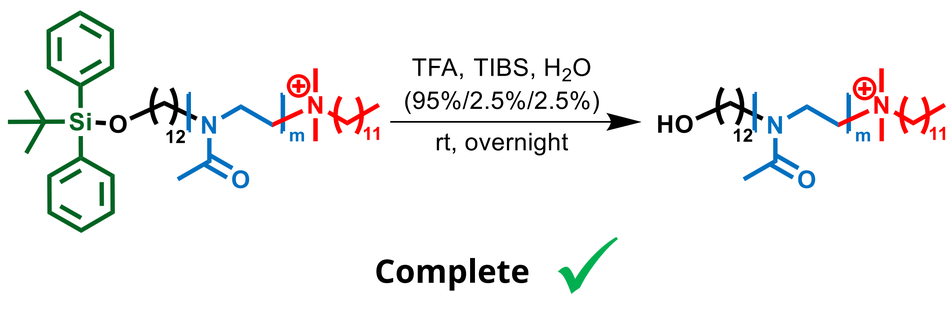
f_{Term} = 0.97



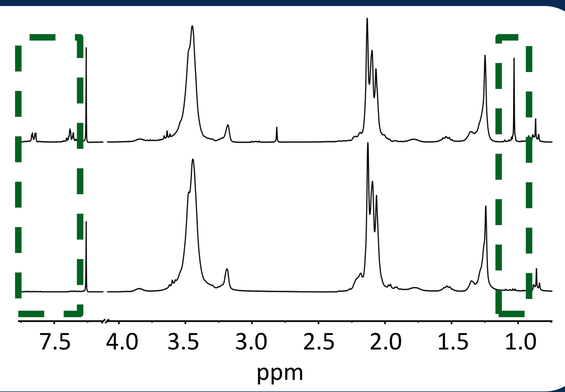


Successful polymerization but side reactions ✓

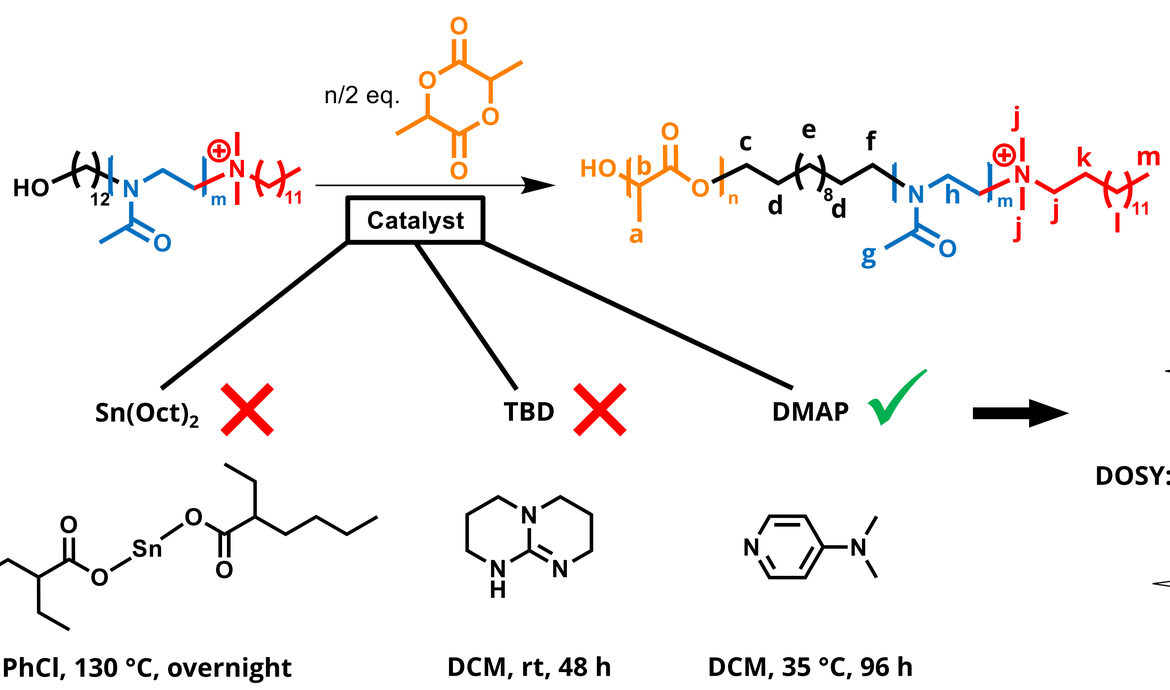
Deprotection

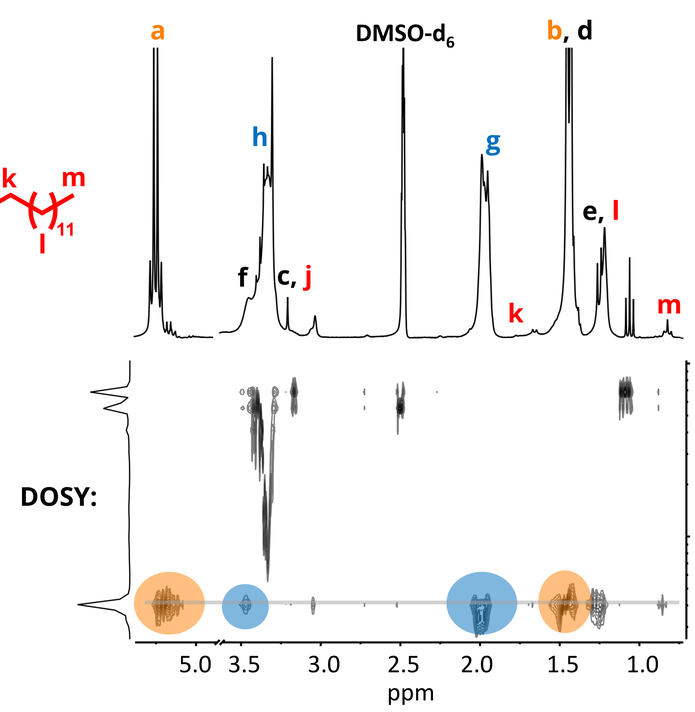


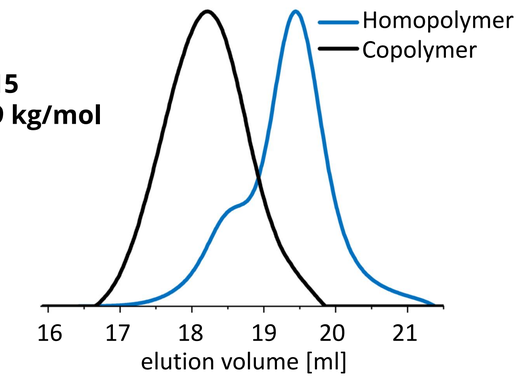
Complete ✓



Copolymerization







- **Increased molar mass**
- **Equal diffusion behavior**

Successful copolymerization but impurities ✓

Summary and Outlook

Copolymer synthesis ✓	**Side reactions** ✗	? **Purification**	? **Surface coating**
Improved conditions ✓	**Impurities** ✗		? **Antimicrobial testing**

References:

[1] Mallakpour, S. *et al*. *Current Opinion in Colloid & Interface Science,* **2021**, 55, 101480.
[2] Lih, E. *et al*. *Progress in Polymer Science,* **2015**, 44, 28-61.
[3] Wee, V. *et al*. *Macromolecules,* **2014**, 47, 1285-1291.
[4] Waschinski, C. J. *et al*. *Advanced Materials*, **2008**, 20, 104-108.
[5] Zhang, N. *et al. Macromolecular Bioscience*, **2012**, 12, 926-936.
[6] Maharana, B. *et al*. *Progress in Polymer Science,* **2009**, 34, 99–124.
[7] Tryba, A. M. *et al*. *Journal of Functional Biomaterials,* **2022**, *13*, 4

GFF TUD GESELLSCHAFT VON FREUNDEN UND FÖRDERERN DER TU DRESDEN E. V.