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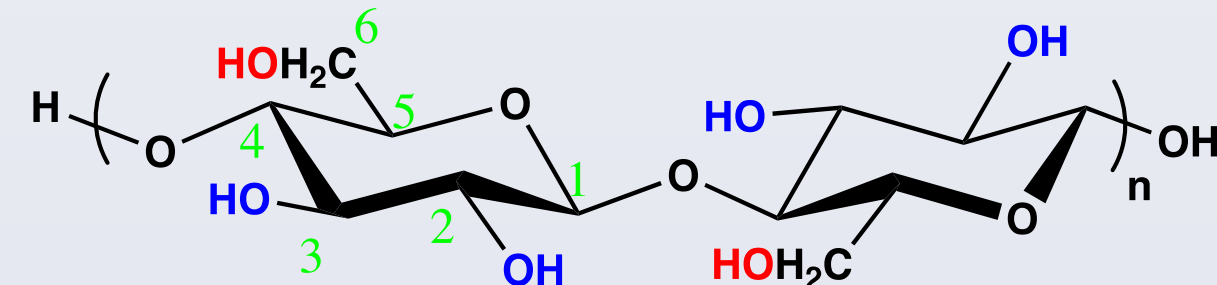
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Areas of Expertise

- ❖ Creation of drug delivery systems to meet patient needs
- ❖ Bioavailability enhancement
- ❖ Synthesis of novel polysaccharide derivatives and biomaterials
- ❖ Chemistry of cellulose and its derivatives
- ❖ Polysaccharide chemistry
- ❖ Structure-property-performance relationships of biomaterials and derivatives

Regioselective Modification of Polysaccharides



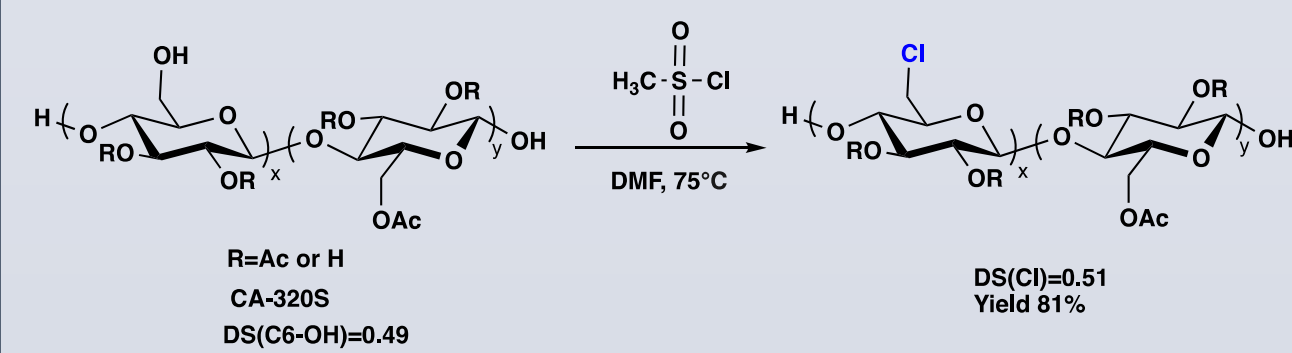
cellulose

novel cellulose derivatives for various applications



cellulose ethers

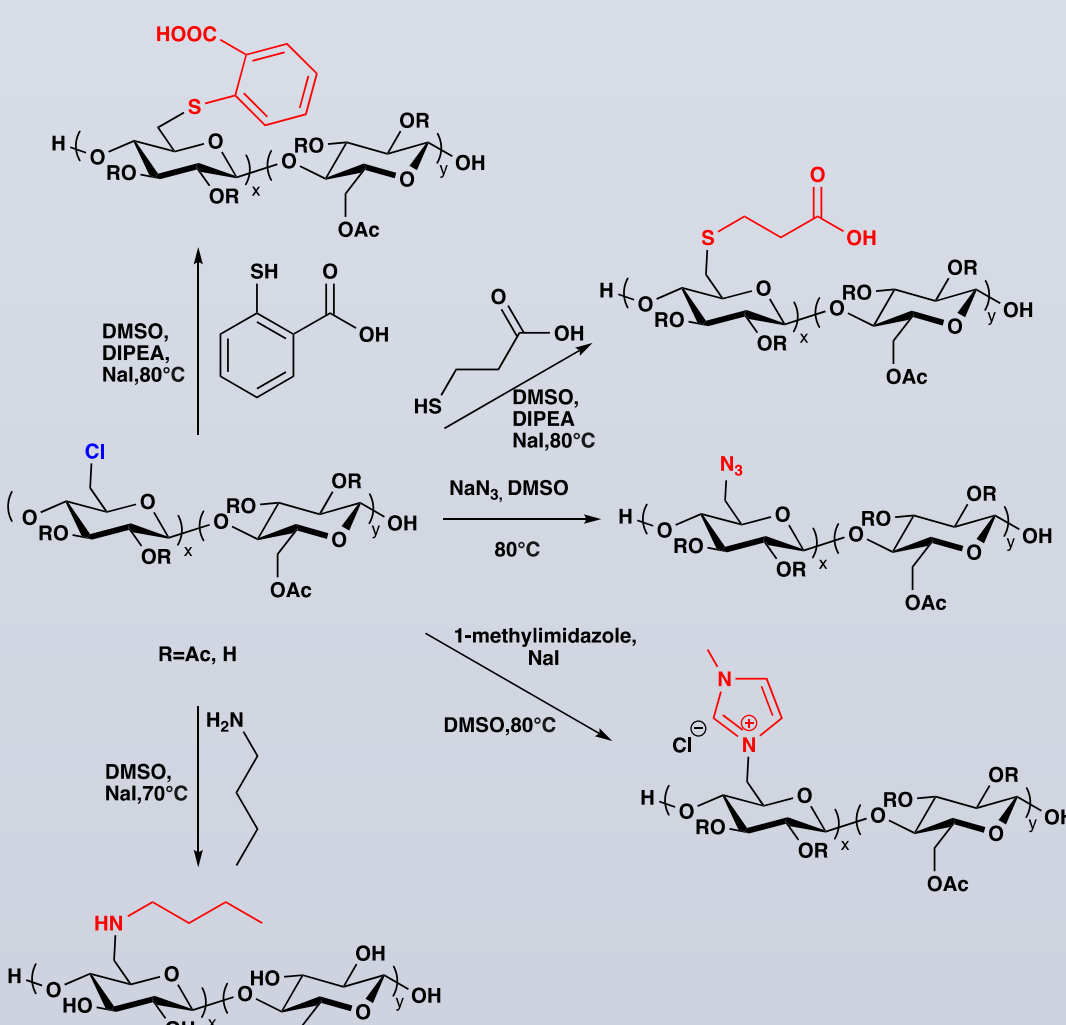
cellulose esters



- Conversion of 6-OH to 6-Cl
- Chemo- and regioselective
- No depolymerization, no deacylation

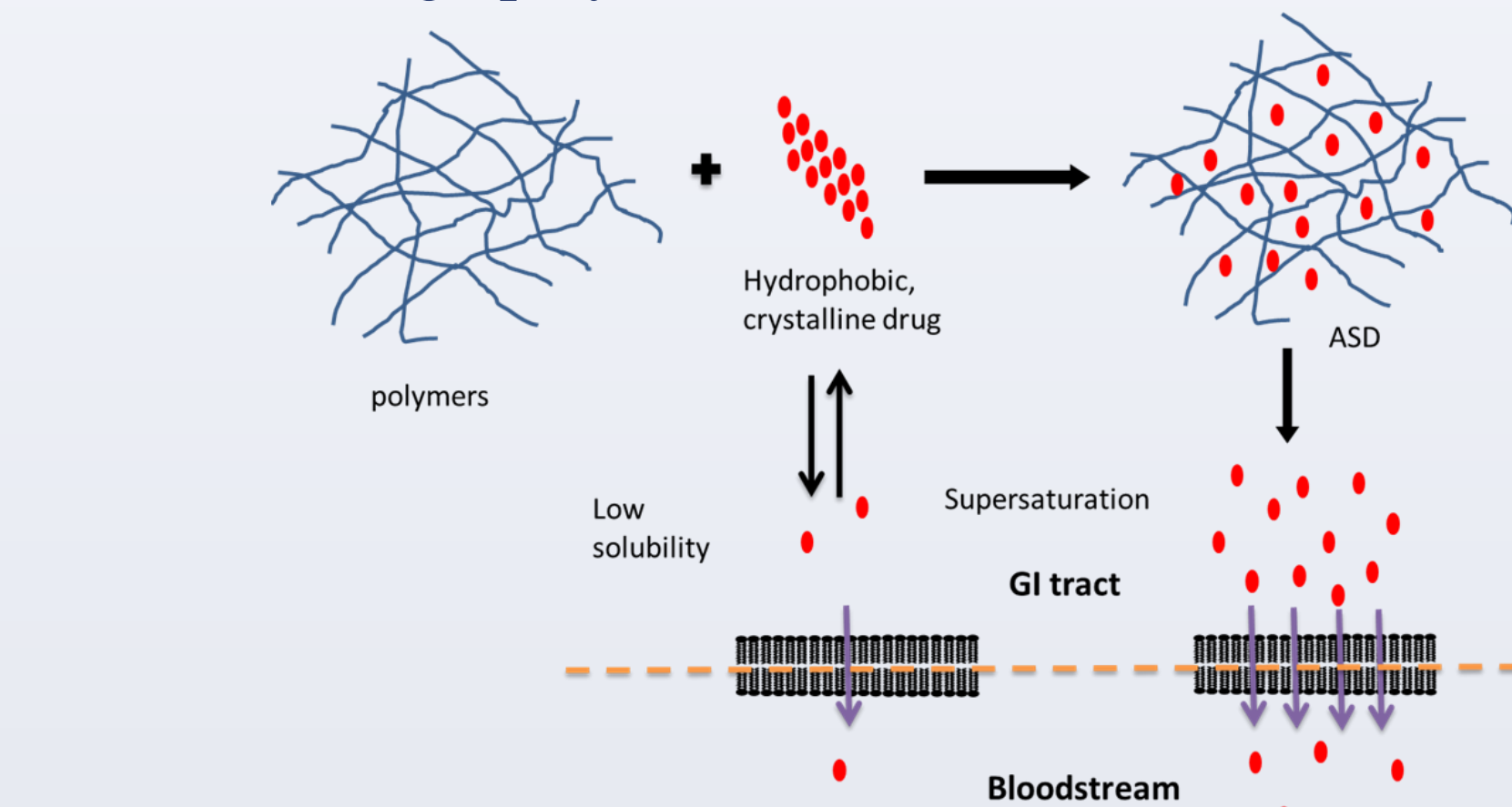
Nucleophilic displacement reactions

- Azide
- Aromatic and aliphatic amines
- Aromatic and aliphatic thiols



Drug Delivery

We design novel polymers for amorphous solid dispersion delivery systems from benign polysaccharides.

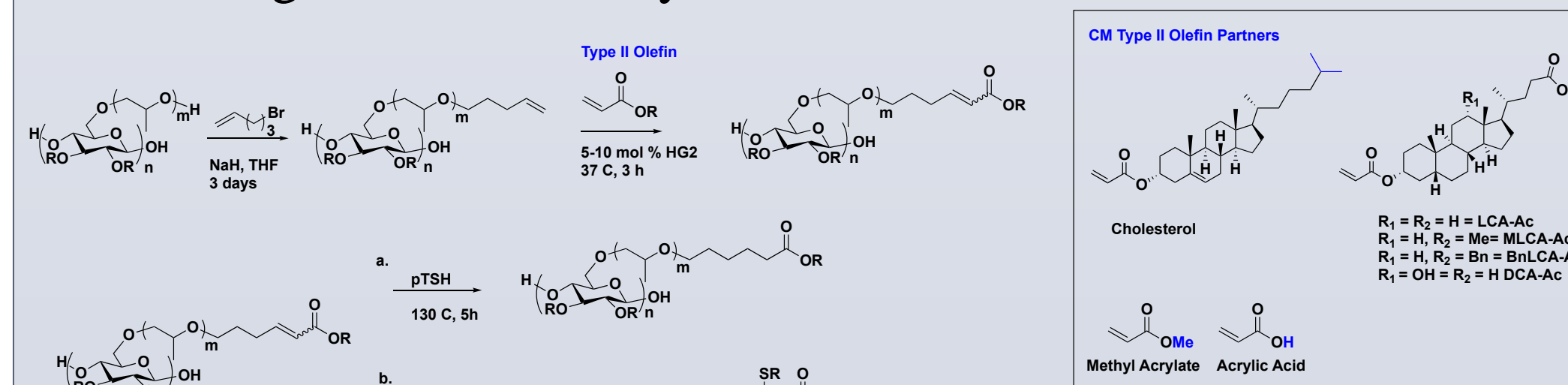


Cellulosic Backbone:

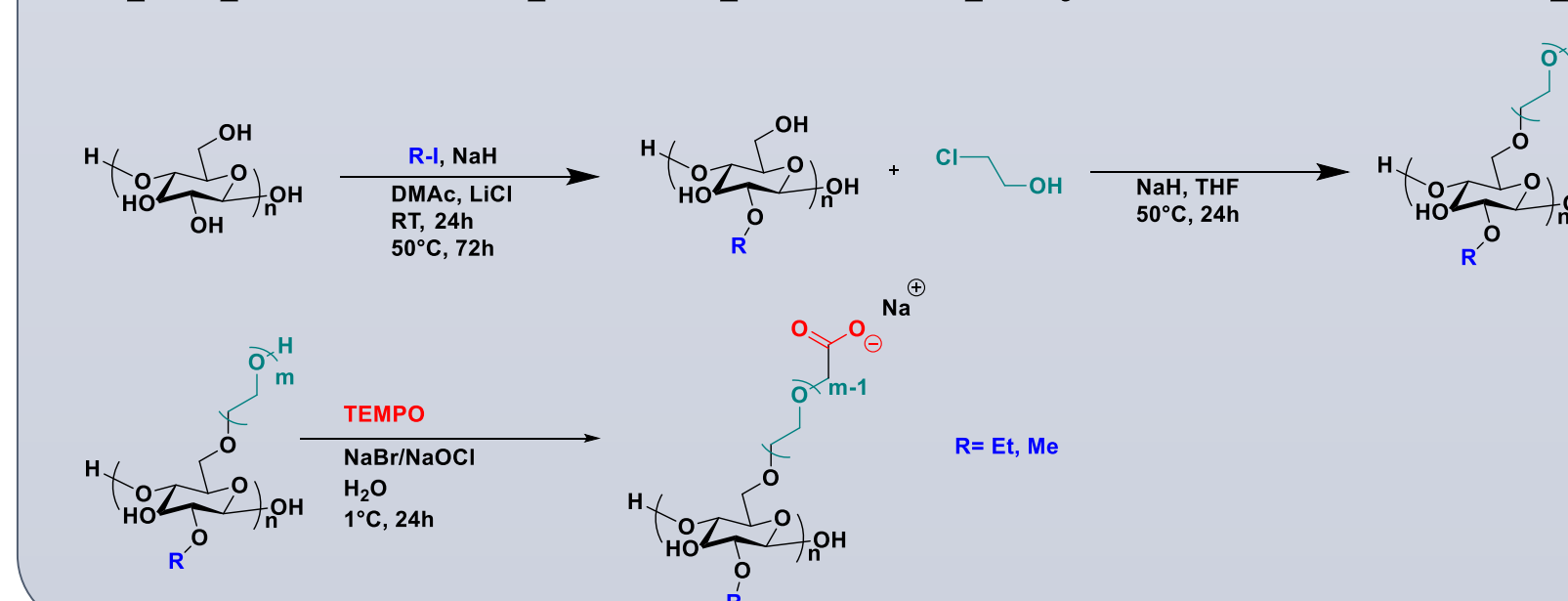
- Biodegradable and non-toxic
- **Hydrophobic side-chain**
- For polymer-drug miscibility
- **Terminal Carboxyl Groups**
- pH triggered drug release
- Polymer-drug interaction

Select Synthetic Strategies

Olefin Cross Metathesis: a mild and efficient approach to impart a wide range of functionality.

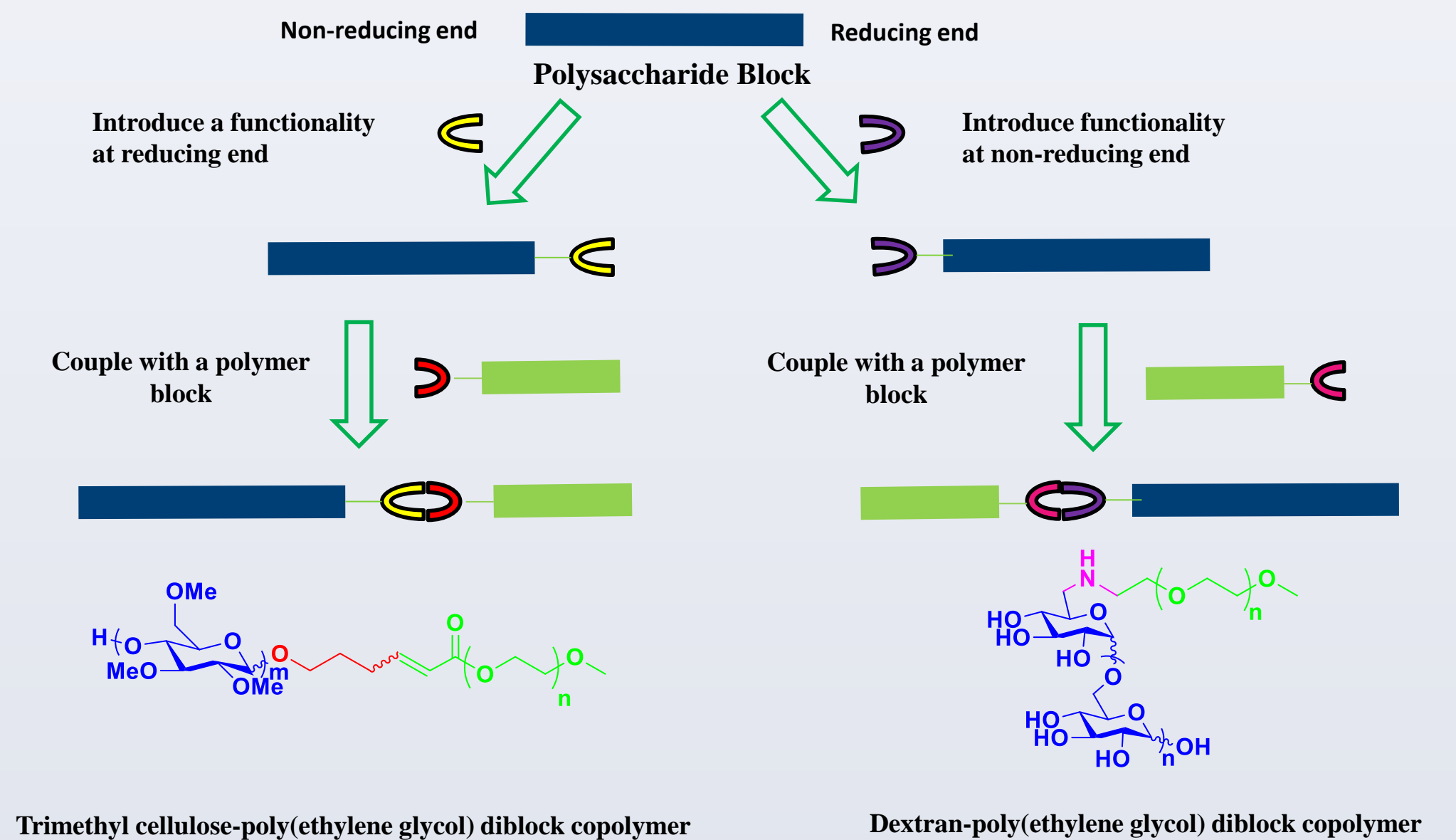


Selective Oxidation: Hydrophobic modification of hydroxyalkyl cellulose derivatives followed by TEMPO oxidation gives amphiphilic and pH responsive polymers for ASD applications.

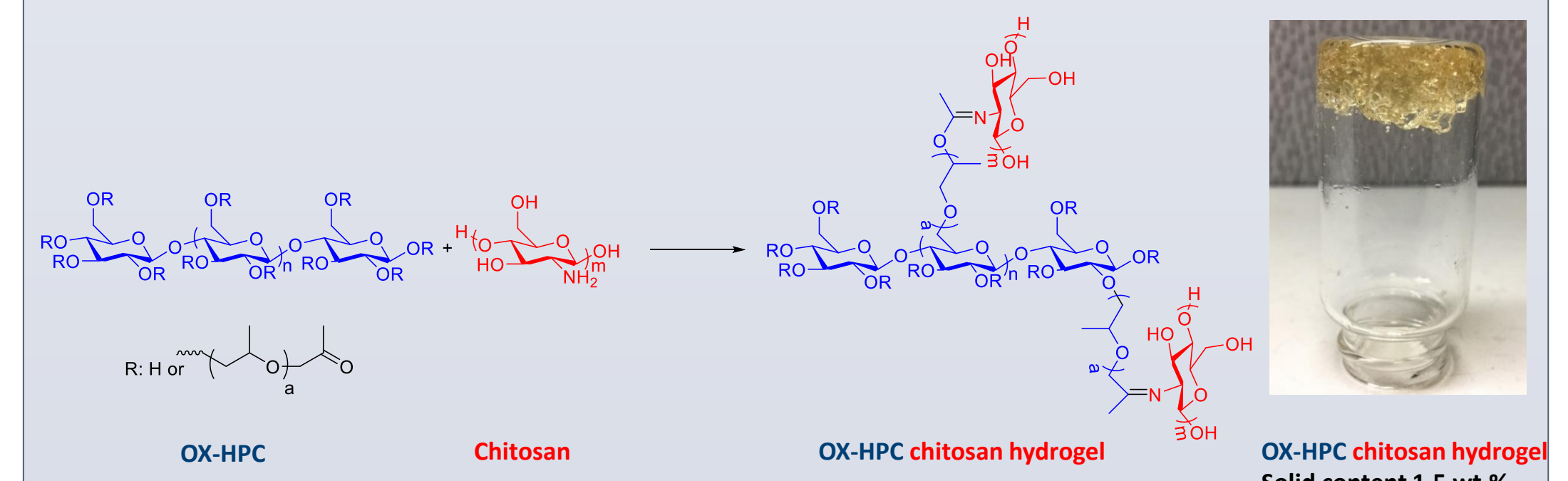


Polysaccharide Based Block Copolymers

In this study, we focused on developing synthetic strategies which can regioselectively modify terminal ends of polysaccharide derivatives and build polysaccharide-based block copolymers. These approaches, including solvolysis, olefin cross-metathesis, amine alkylation and azide-alkyne cycloaddition, have generated series of trimethyl cellulose-based block copolymers and dextran-based block copolymers.



Polysaccharide-Based Hydrogel



Acknowledgments

