Synthesis of new substituted poly(ε-caprolactones) by combination of Ring-Opening Polymerization, Atom Transfer Radical Addition and Click reactions.

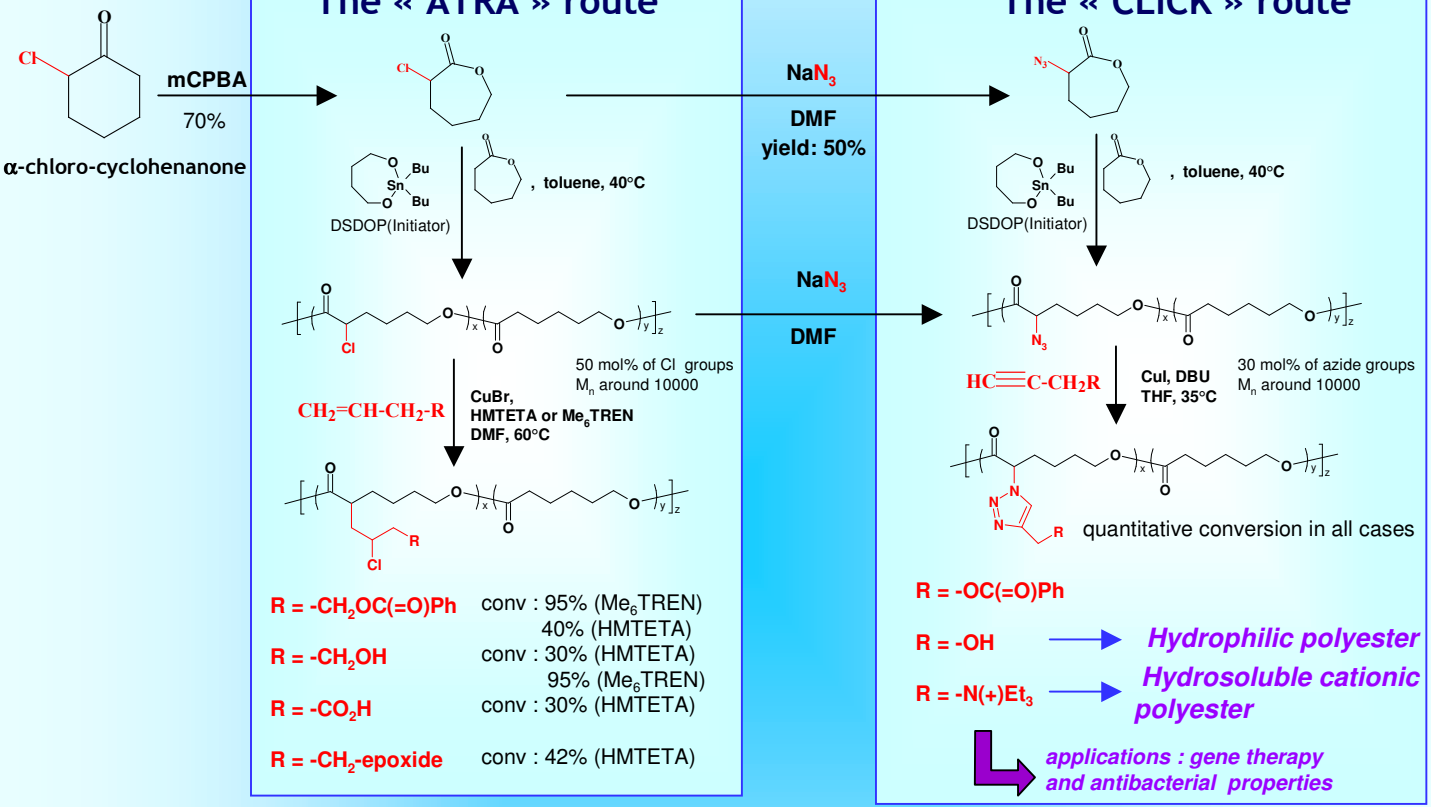
R. Riva, S. Schmeits, Ch. Jérôme-Alexandre, R. Jérôme, Ph. Lecomte

Center for Education and Research on Macromolecules (CERM), University of Liège, B6a Sart-Tilman, B-4000 Liège, Belgium: http://www.ulg.ac.be/cerm, E-mail: philippe.lecomte@ulg.ac.be

Aim of the work

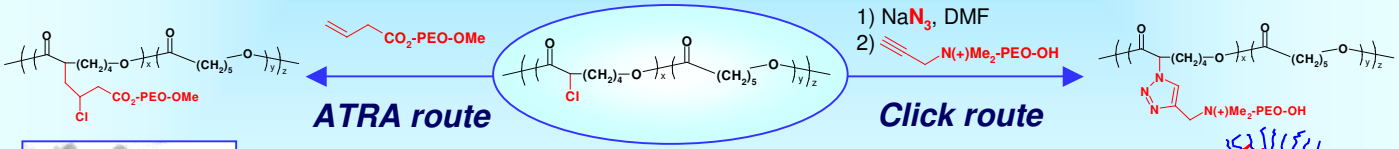
To implement a straightforward synthesis of a wide range of highly functional aliphatic polyesters exhibiting various properties from a single commercially available precursor (α-chlorocyclohexanone) with minimized degradation.

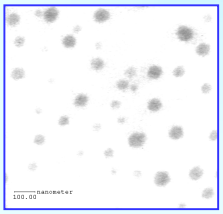
Strategy



- ✓ High conversion both by ATRA (ligand = Me_6TREN) and Click processes.
- ✓ For the ATRA route, CuBr/Me_6TREN is more reactive but is less tolerant than CuBr/HMTETA.
- ✓ No cumbersome protection/deprotection reactions by ATRA (ligand = HMTETA) and click processes
- ✓ Mild conditions and thus, minimized degradation.
- ✓ The « Click route » is often advantageous compared to ATRA, even if one additional step is required, because of high conversion, high tolerance to more functional groups and milder conditions.

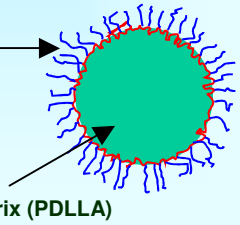
Application: synthesis of an amphiphilic graft copolymer poly(εCL-g-EO)





- conversion around 30% whatever the route used
- purification of the polymer by dialysis
- forms micelles in water as evidenced by light scattering and TEM

- Application: the graft copolymer is a stabilizer for the preparation of stealth nanoparticules for drug delivery applications.



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