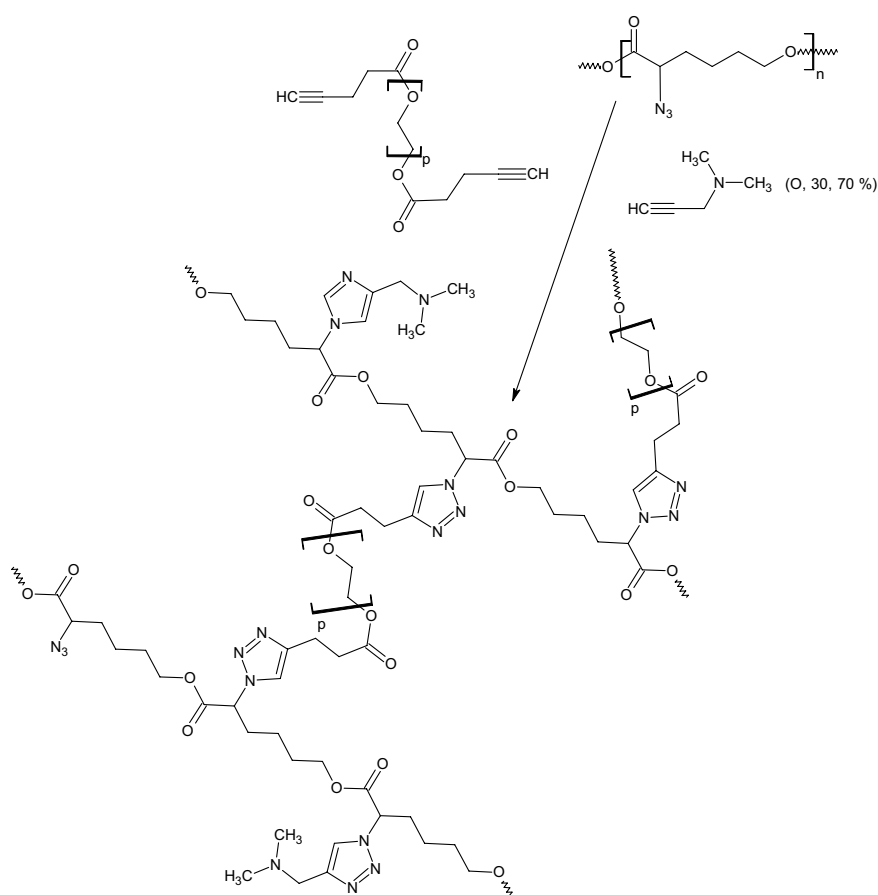


## PREPARATION OF BIODEGRADABLE POLY( $\epsilon$ -CAPROLACTONE) BASED HYDROGELS PREPARED BY HUISGEN TYPE COPPER CATALYZED 2+3 DIPOLAR CYCLOADDITION (CLICK CHEMISTRY) AND ATRA ADDITION

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**Figure 1.** Preparation of hydrogel

Biodegradable and biocompatible hydrogels are widely used for biomedical applications, as biomaterial for drug delivery applications. Nevertheless, it is essential to tune as finely as possible the macroscopic properties of these hydrogels, e.g., mechanical properties, biodegradation rate, bioadhesion. Derivatization of copolymers of poly( $\epsilon$ -caprolactone) (PCL) by "click" reactions is very efficient.<sup>1, 2, 3, 4</sup> Remarkably, it was shown that, when click reaction is performed in tetrahydrofuran (THF) at 35°C, minimized degradation, if any, is observed.<sup>1, 2, 3</sup> The conditions are so mild that the grafting of poly(ethyleneglycole) (PEO) by "click" was also very efficient onto copolymers of very sensitive poly(lactide) (PLA), also with minimized degradation.<sup>1</sup>

In this contribution we report the synthesis of highly functional networks by "one pot" derivatization of aliphatic polyesters followed by cross-linking by "click" reactions or atom transfer radical addition (ATRA). Our strategy is based on the following sequence of reactions: (i) the

synthesis of an aliphatic polyester with attached chloro groups by ring-opening polymerization<sup>5</sup> (ii) the conversion of chloro groups into azides by reaction with sodium azide<sup>3</sup> (iii) the "one pot" derivatization by "click" reactions of pendant azide with duly substituted alkyne followed by cross-linking with a multifunctional alkyne. In order to validate our synthetic strategy, we have decided to undertake the "one-pot" partial "click" reaction of a part of pendant azide groups of poly( $\alpha$ -azido- $\epsilon$ -caprolactone) with N,N-dimethyl-3-propyn-1-amine, followed by cross-linking of residual pendant azide with telechelic  $\alpha$ - $\omega$ ,dialkyne-polyethyleneglycole (Scheme 1). This approach was compared to derivatization of polyester polymer chains using atom transfer radical addition with the aim of preparation physically cross-linked hydrogels by introducing different polar functional groups (alcohol, carboxylic acid and amine) into the triblock copolymers of  $\epsilon$ -caprolactone and 3-chloro-2oxepanone. Click approach appears to be more promising.

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