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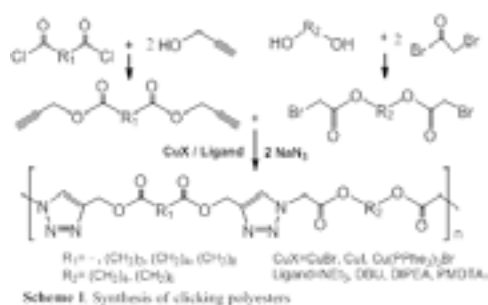
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Synthesis of new biodegradable clicking polyesters via tricomponent step-growth polymerization

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Thanks to mild reaction conditions, functional group tolerance and quantitative yields click reactions are extensively used for the synthesis of a variety of polymer constructs including functionalized polymers and biopolymers, block copolymers, cyclic polymers, etc., “Click chemistry” (CC) is a rapidly growing field of research. Surprisingly, there are only few papers on the application of CC in step-growth polymerization (SGP) as a chain propagation reaction, and, to our best knowledge, there are no examples of the synthesis of biodegradable polymers such as aliphatic polyesters (PEs), polyamides and poly(ester amide)s *via* CC. The present study is the first attempt of the synthesis of new biodegradable “clicking” polyesters on the basis of non-toxic building blocks such as fatty diols and dicarboxylic acids using click chemistry-based SGP. Among a variety of click reactions we have selected copper(I) catalyzed alkyne–azide 1,3-cyclo–addition reaction due to availability of starting reagents for obtaining suitable monomers leading to the formation of 1,2,3-triazole cycles. It is expected that the insertion of 1,2,3-triazole groups in the PEs backbone can, firstly, improve their thermal characteristics; secondly, a weak basicity of 1,2,3-triazole cycle can catalytically influence their non-specific hydrolysis (biodegradation), and, finally, the possibility of quaternization of 1,2,3-triazole cycles using halo-alkyls opens a way to positively charged systems - either water soluble polymers or cross-linked hydrogels both promising for various biomedical applications. Synthesis of the new PEs has been carried out on the basis of di-propargyl esters of dicarboxylic acids and di-(bromoacetic acid)-alkylene diesters in the presence of sodium azide via tricomponent in situ click reaction (Scheme 1). Optimal reaction parameters (catalyst, solvent, solution concentration, reaction temperature, etc.) for the new click SGP have been established and the resulting PE's have been characterized by FTIR, NMR, GPC, visco–simetry and DSC.



Biography

Tengiz Kantaria has his expertise in the preparation and characterization of nanoparticles on the basis of amino acid based biodegradable poly(ester amide)s (MS thesis, 2015). Currently as a PhD student he is engaged in the synthesis and characterization of new biodegradable polymers (polyesters, polyamides, and poly(ester amide)s) via Cu(I) catalyzed alkyne–azide 1,3-cycloaddition click reaction.

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