

Synthesis and properties of poly(urethane-siloxane) copolymers via Cu(I)-catalyzed azide-alkyne click reaction and its application in 3d printing

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It is known that despite some unique properties, polydimethyloxanes (PDMS) without modifications have poor mechanical characteristics. Currently, modification of the structure of siloxane compounds has become one of the actual and priority tasks in materials science.

One of the promising strategies for achieving the necessary properties of PDMS-based materials is the synthesis of copolymers consisting of alternating hard and soft segments. Urethanes are used as hard fragments, and siloxanes are used as soft fragments [1]. Poly(urethane-siloxane) copolymers, due to their unique hybrid characteristics, are already used as protective coatings, selective membranes and medical implants.

In this study, we propose to obtain copolymers using a method known as "click" chemistry, namely, by the reaction of Cu(I)-catalyzed azide-alkyne cycloaddition. This method combines the relative simplicity of performing reactions, high yield of the desired product and low impurity content. We also investigated the physical and mechanical properties of the copolymers and presented initial results of the 3D printing.

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References

1 E. Yilgör, I. Yilgör, Progress in Polymer Science, 2014, Vol. 39, No. 6, P. 1165-1195.