Photodegradable polyacetal-based cross-linkers

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Photodegradable polymers constitute an emerging class of materials that finds numerous applications in biotechnology, biomedicine, and nanoscience [1]. Photodegradable polymers in the form of hydrogels are of particular interest, because of their excellent adaptation in cell cultures allowing also the spatiotemporal control of their gelation behavior by an external stimulus such as light irradiation.

In this work, we have synthesized photodegradable cross-linkers based on a photodegradable acetal oligomer decorated with methacrylate terminal groups. The photodegradable methacrylate terminated oligomers were synthesized via a two-step process. In the first step, 2-nitroresorcinol was reacted with an excess of cyclohexanol divinyl ether in mildly acidic conditions to obtain a photocleavable acetal oligomer with vinyl ether terminal groups. For the second step, 2-hydroxyethyl methacrylate was added in the reaction to convert the vinyl ether terminal groups of the oligomer into methacrylate functionalities (figure 1). The progress of the reaction was monitored by gel permeation chromatography and proton nuclear magnetic resonance spectroscopy.

Our novel photocleavable cross-linker is a potentially versatile and convenient material used for the development of photodegradable hydrogels for biomedical applications. Their degradation upon visible light irradiation at very low dosages is envisaged [2].

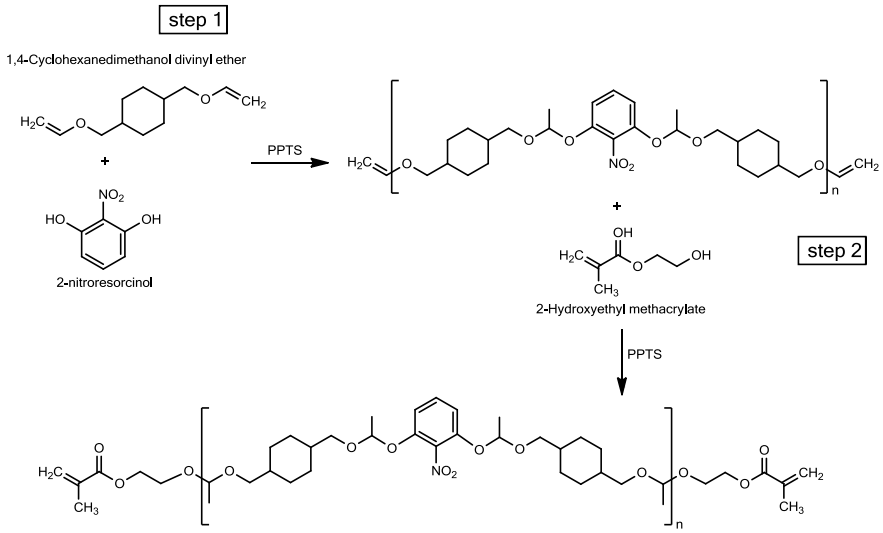

Figure 1: Synthesis of a photodegradable cross-linker

References

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