Ultrafast In Situ Forming Poly(ethylene glycol)-Poly(amido amine) Hydrogels with Tunable Drug Release Properties via Controllable Degradation Rates
Sytze Buwalda, Audrey Bethry, Sylvie Hunger, Sofian Kandoussi, Jean Coudane, Benjamin Nottelet

To cite this version:

HAL Id: hal-02421528
https://hal-mines-paristech.archives-ouvertes.fr/hal-02421528
Submitted on 20 Dec 2019

HAL is a multi-disciplinary open access archive for the deposit and dissemination of scientific research documents, whether they are published or not. The documents may come from teaching and research institutions in France or abroad, or from public or private research centers.

L’archive ouverte pluridisciplinaire HAL, est destinée au dépôt et à la diffusion de documents scientifiques de niveau recherche, publiés ou non, émanant des établissements d’enseignement et de recherche français ou étrangers, des laboratoires publics ou privés.
Ultrafast In Situ Forming Poly(ethylene glycol)-Poly(amido amine) Hydrogels with Tunable Drug Release Properties via Controllable Degradation Rates

Sytze Buwalda, Audrey Bethry, Sylvie Hunger, Sofian Kandoussi, Jean Coudane, Benjamin Nottelet
Department of Artificial Biopolymers, Institute of Biomolecules Max Mousseron (IBMM, UMR5247), University of Montpellier, France

1 Present address: MINES ParisTech, PSL Research University, Center for Materials Forming (CEMEF), UMR CNRS 7635, CS 10207, 06904 Sophia Antipolis, France

Introduction

Dendrimers have attracted increasing attention for the preparation of biomedical hydrogels thanks to their uniformity combined with control over their size, architecture, density and surface groups. In most poly(amino amide) (PAMAM) based hydrogels, linear poly(ethylene glycol) (PEG) was employed as crosslinking agent. However, star-shaped PEGs offer various advantages over linear PEGs, such as a higher concentration of end groups, which may result in faster gelation. Furthermore, control over hydrogel degradation is an important item that has yet received little attention regarding PEG-PAMAM hydrogels. This prompted us to prepare in situ forming PEG-PAMAM hydrogels by reacting PAMAM with multi-armed PEGs containing either a hydrolysable ester group or a stable amide group near each PEG end.

Preparation of PEG-PAMAM hydrogels

Gelation behavior

In vitro degradation

Release of model compounds in vitro

Cytotoxicity

Conclusions

The possibility to be formed in situ and their tunable mechanical, degradation and release properties make these PEG-PAMAM hydrogels appealing as controlled drug delivery systems.