Photoinduced chitosan-PEG hydrogels with long-term antibacterial properties

Pauline Sautrot-Ba[a], Nicolo Razza[b], Louise Breloy[a], Samir Abbad Andaloussi[c], Annalisa Chiappone[b], Marco Sangermano[b], Christophe Hélary[d], Sabrina Belbekhouche[a], Thibaud Coradin[d], Davy-Louis Versace[a]*

[a] *Institut de Chimie et des Matériaux Pari-Est, UMR-CNRS 7182, UPEC, 2-8 rue Henri Dunant, 94320 Thiais, France.* ***Corresponding author****: versace@icmpe.cnrs.fr. Tel.: 01.49.78.12.28, Fax: 01.49.78.12.08*

[b] *Politecnico di Torino, Dipartimento di Scienza Applicata e Tecnologia, C.so Duca degli Abruzzi 24, 10129 Torino, Italy.*

[c] *Laboratoire Eau, Environnement, Systèmes Urbains (LEESU) - UMR-MA 102, Faculté des Sciences et Technologie, Maison des Sciences de l'Environnement, 61 avenue du Général de Gaulle, 94010 Créteil cedex, France.*

[d] *Sorbonne Universités, UPMC Univ Paris 06, CNRS, Collège de France, UMR 7574, Laboratoire de la Chimie de la Matière Condensée de Paris, 4 place Jussieu, 75005 Paris, France.*

FIGURES

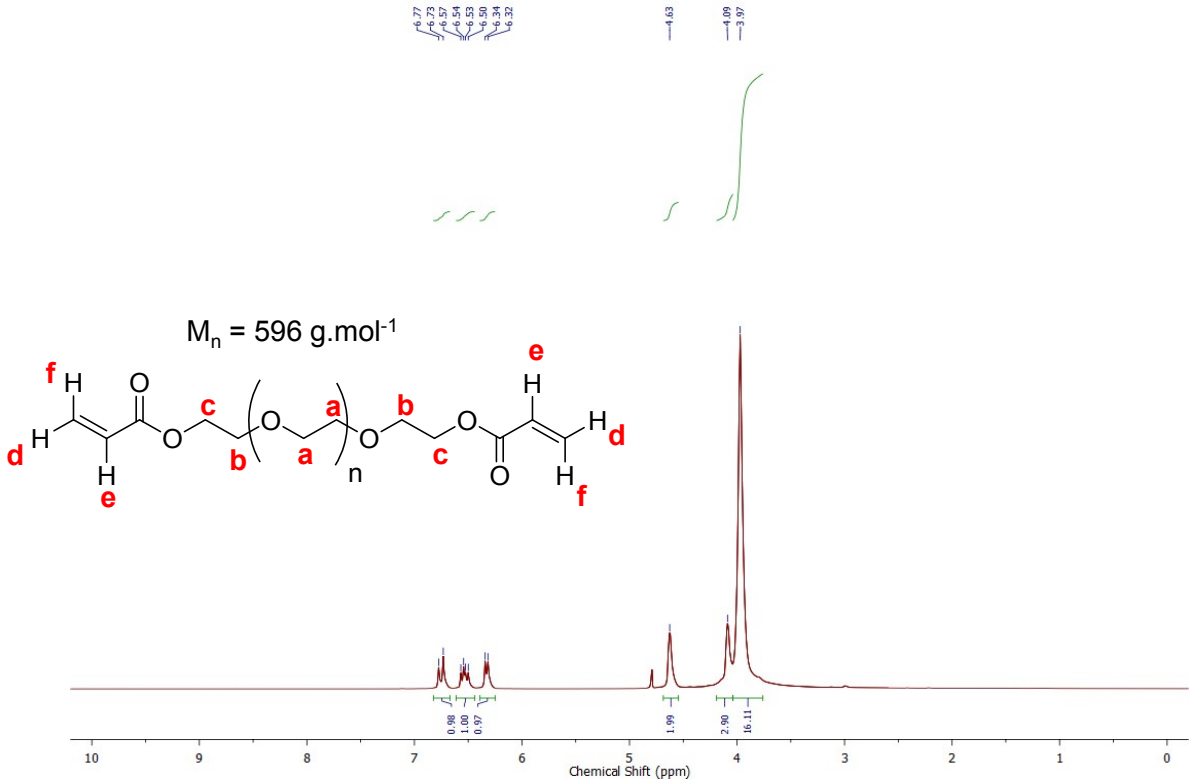


Figure S1. ^{1}H NMR spectrum of the commercial PEG-DA in D_2O.

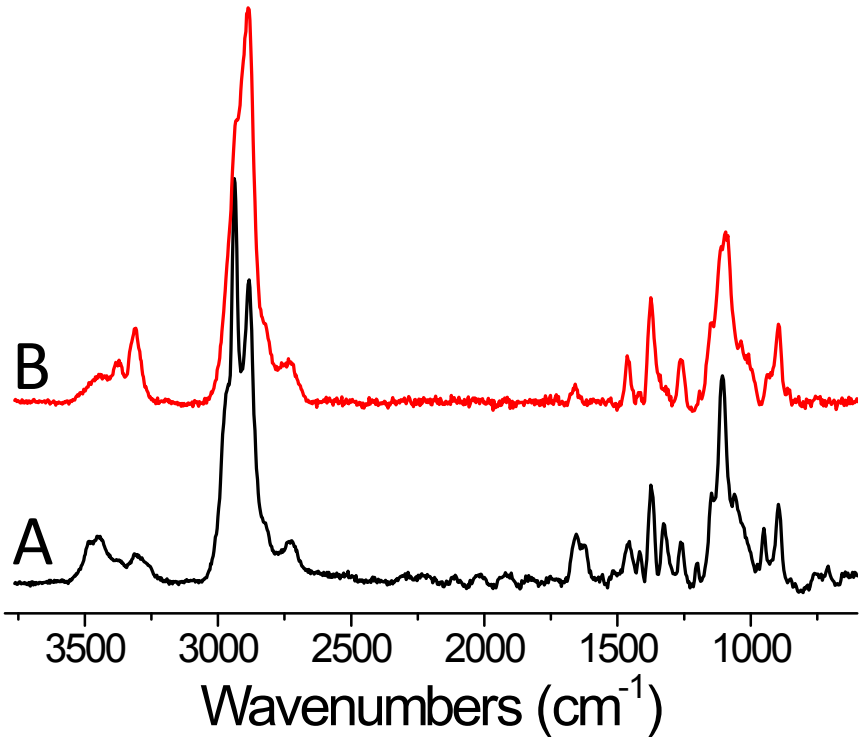


Figure S2. Raman spectra of A) the methacrylamide-based chitosan (chito-MA) and B) the native chitosan.

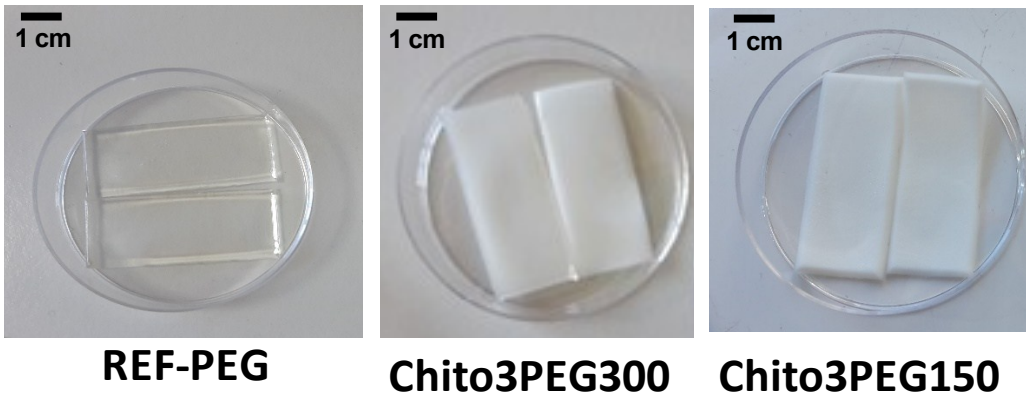


Figure S3. Optical images of the **REF-PEG**, **chito3PEG300** and **chito3PEG150** hydrogels**.**

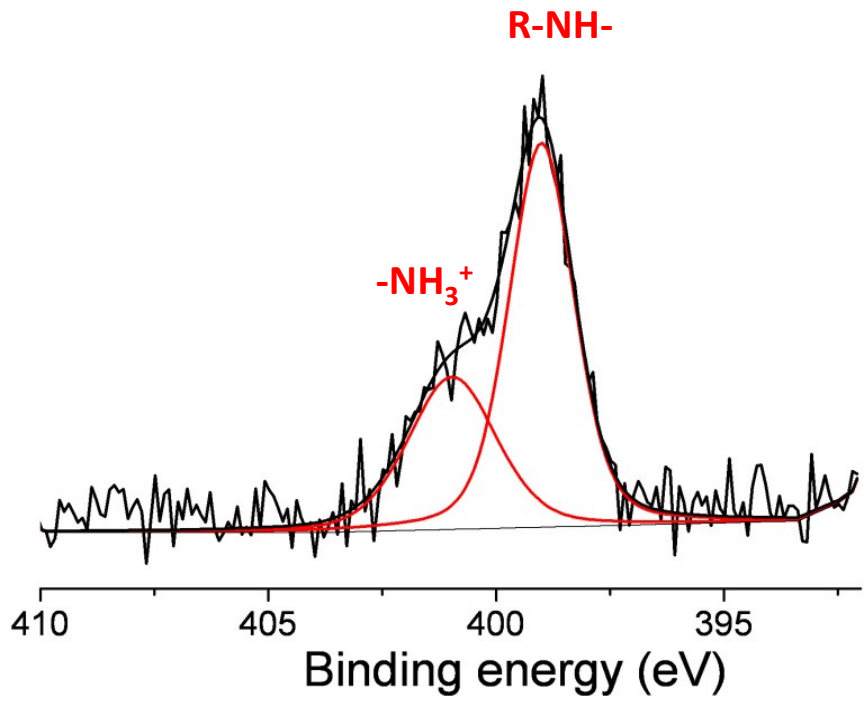


Figure S4. XPS spectra of the N1s core levels of the surface of the **chito3PEG150** hydrogel sample.

TABLES

Table S1. Structure of the polymer used and photoinitiating systems used in this study.

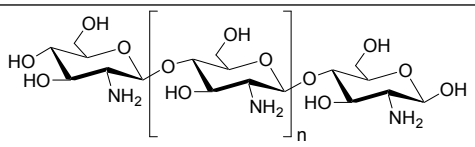
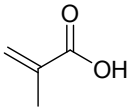
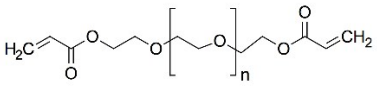
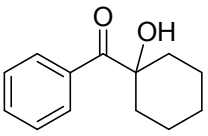
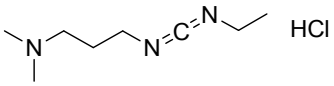
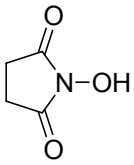
Name	Formula	Use for
Chitosan		Antibacterial macromolecule for monomer modification
Methacrylic acid		Modification of chitosan
Polyethylene glycol (400) diacrylate (PEG-DA)		Acrylate monomer
1-Hydroxy-cyclohexyl-phenyl-ketone (Irgacure 184, I184)		Photoinitiator
N-(3- (dimethylamino)propyl)-N′-ethylcarbodiimide hydrochloride (EDC)		Activation of the carboxylic acid group
N-hydroxysuccinimide (NHS)		

Table S2. Polymerization rates ($R_p/[M_0]$) of PEG-derived hydrogels ($[M_0]$ is the initial monomer concentration) and final conversions (at t = 100 s) for 100 µm-thick films under air. Xenon-Mercury lamp. I_o = 60 mW.cm^{-2}.

Photoinitiating formulations	$(R_p/[M_0])$ x 100 (s^{-1})	Final conversion (%) after 100 s
REF-PEG	16	92
Chito3PEG300	4.8	100
Chito3PEG150	1.5	100