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Supplementary information for

Thermosensitive polynorbornene poly(ethylene oxide) nanoparticles loaded with oligoDNAs : an innovative approach for acting on cancer-associated pain

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- **S1: ^{1}H NMR spectra**

- **S2: Calculation of the amount of active molecules per NP (Glucosamine; Rhodamine)**

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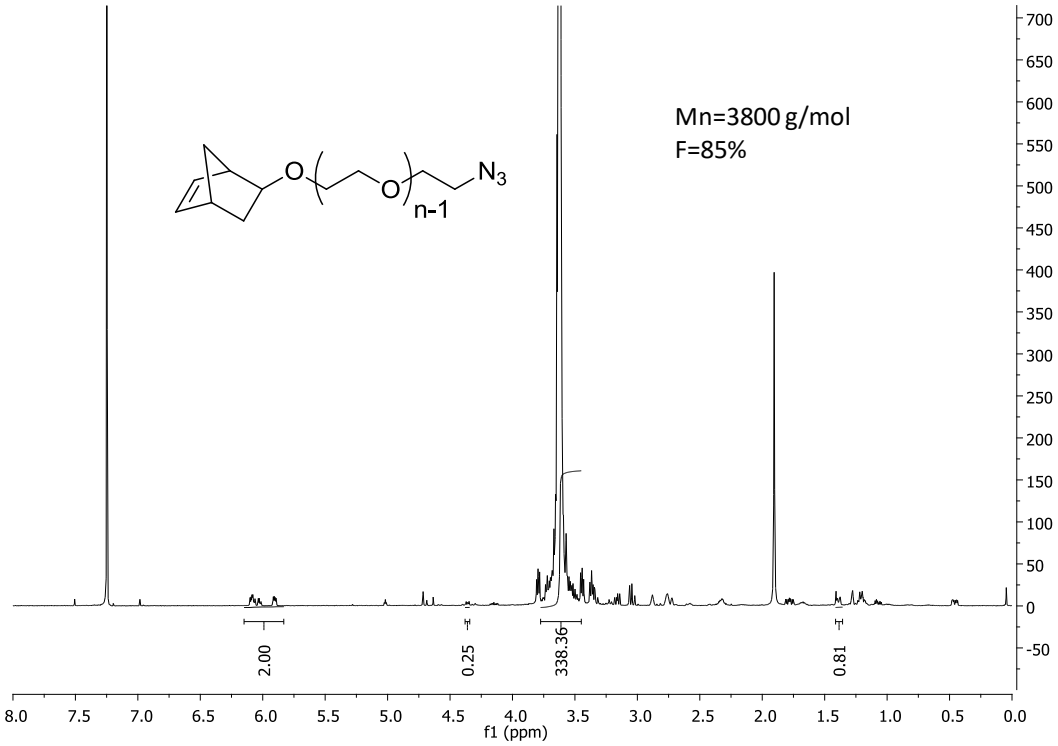
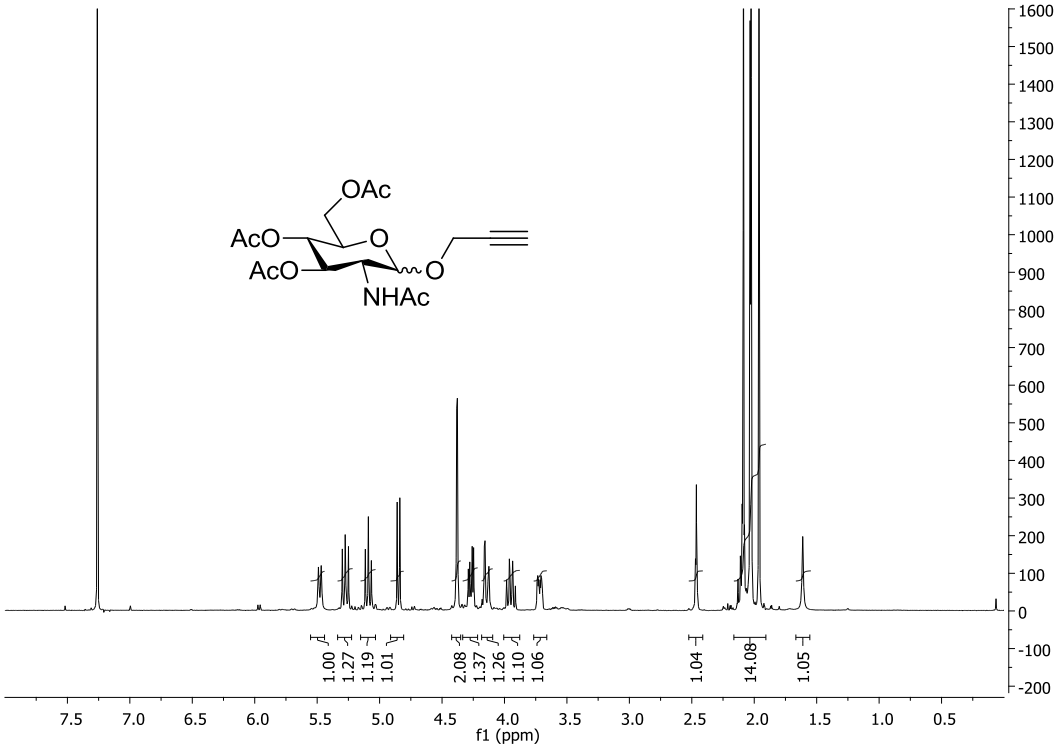
- **S5: ACSF preparation and final NPs concentration in ACSF medium**

S1: ^{1}H NMR spectra:

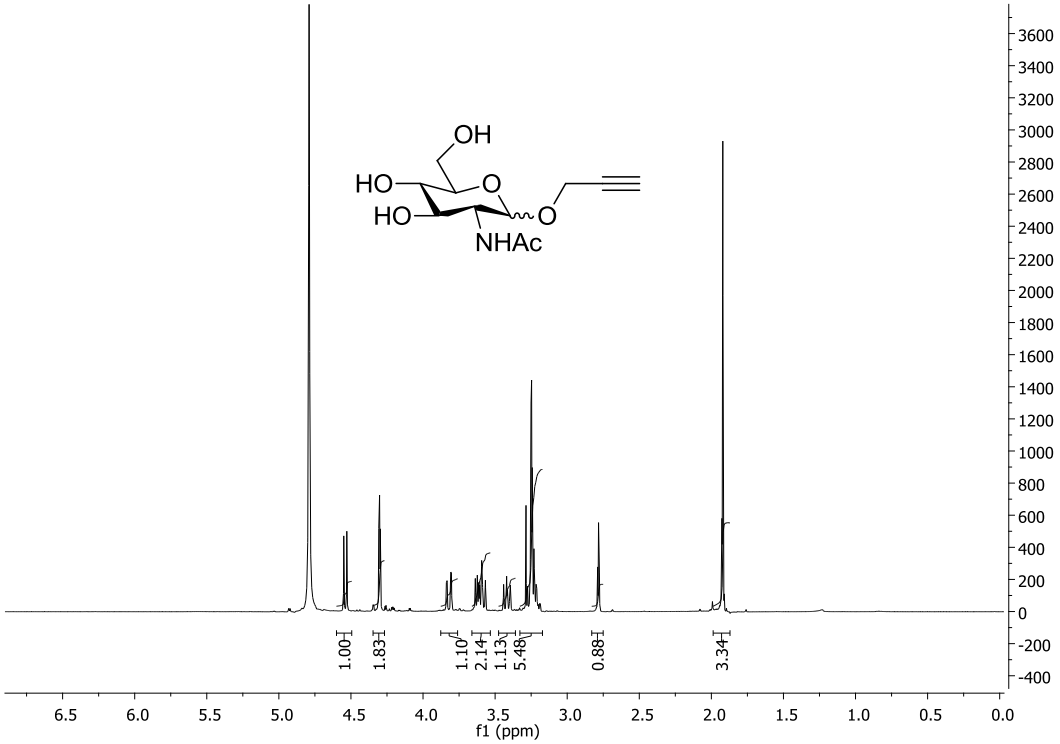
- α-norbornenyl-ω-azide-poly(ethylene oxide) (3)



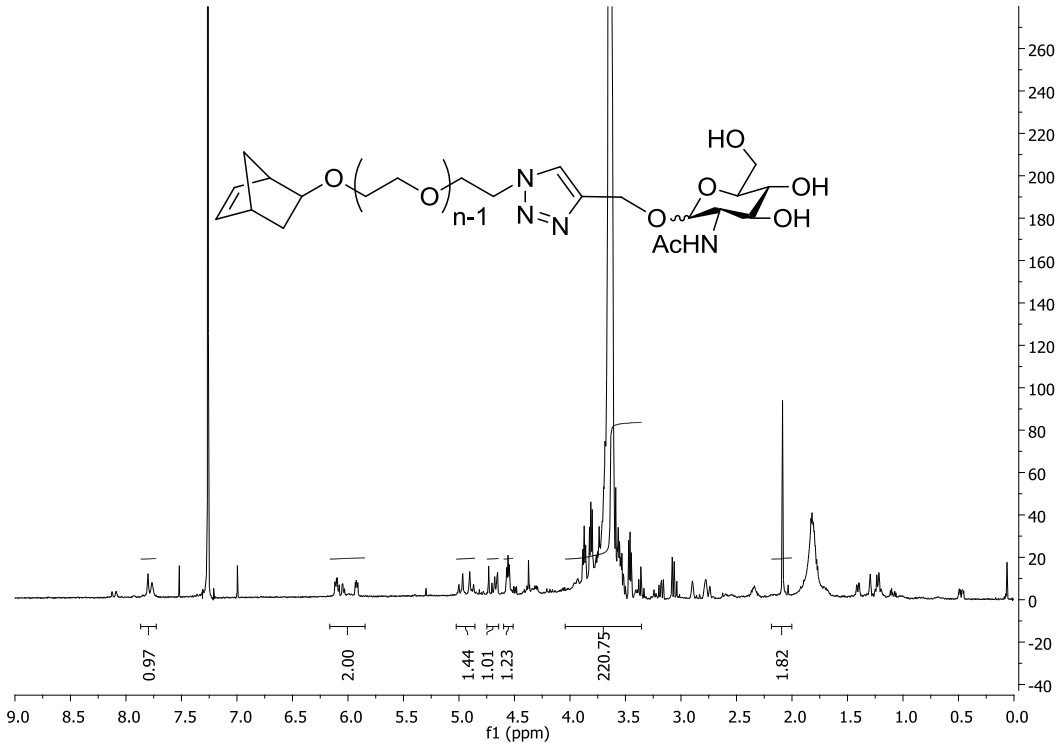
- Propargyl 2-acetamido-3,4,6-tri-O-acetyl-2-deoxy-α-D-glucopyranoside (5)



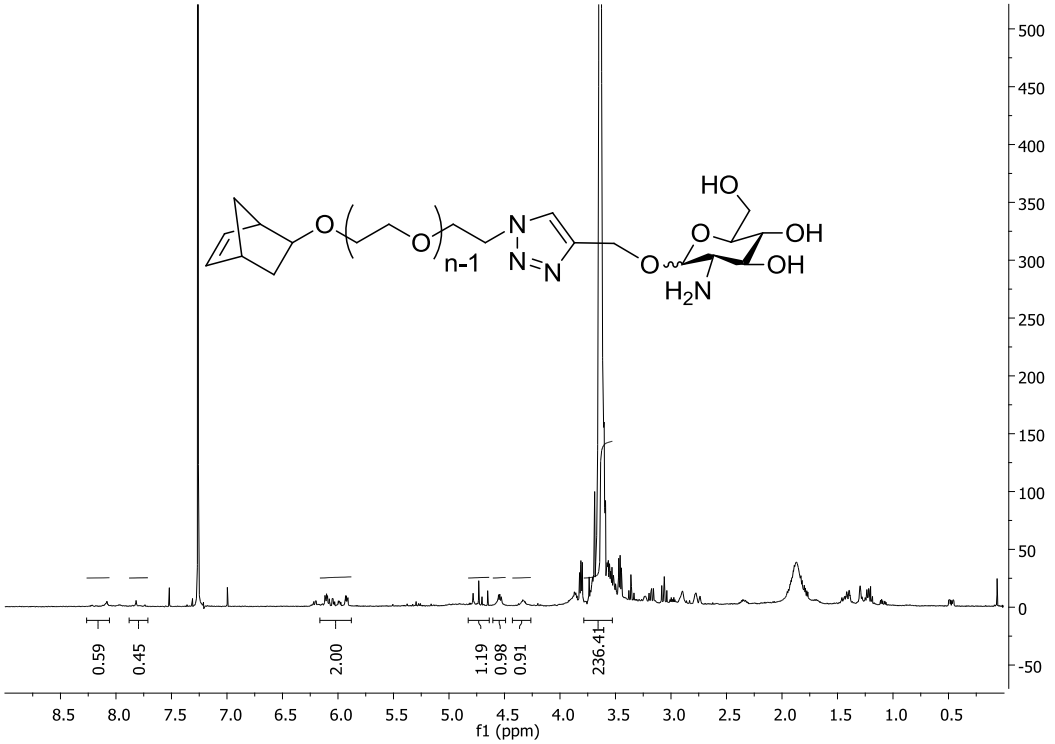
- Propargyl 2-acetamido-2-deoxy-β-D-glucopyranoside (6)



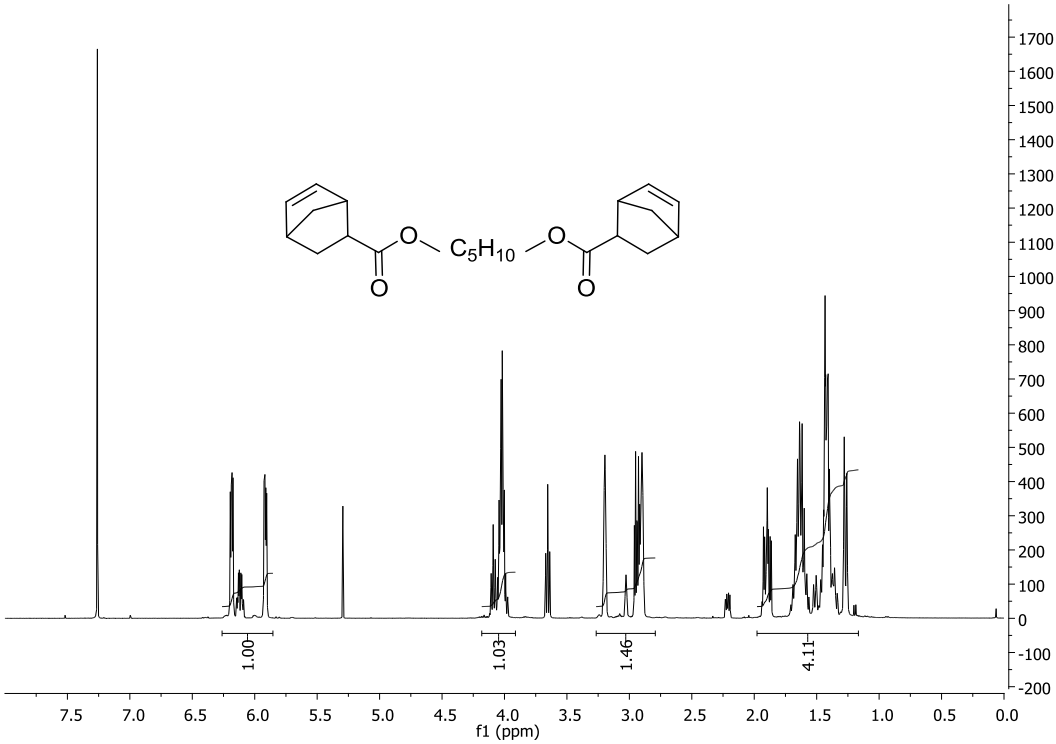
- Acetyl protected α-norbornenyl-ω-glucosamine-poly(ethylene oxide) (7)



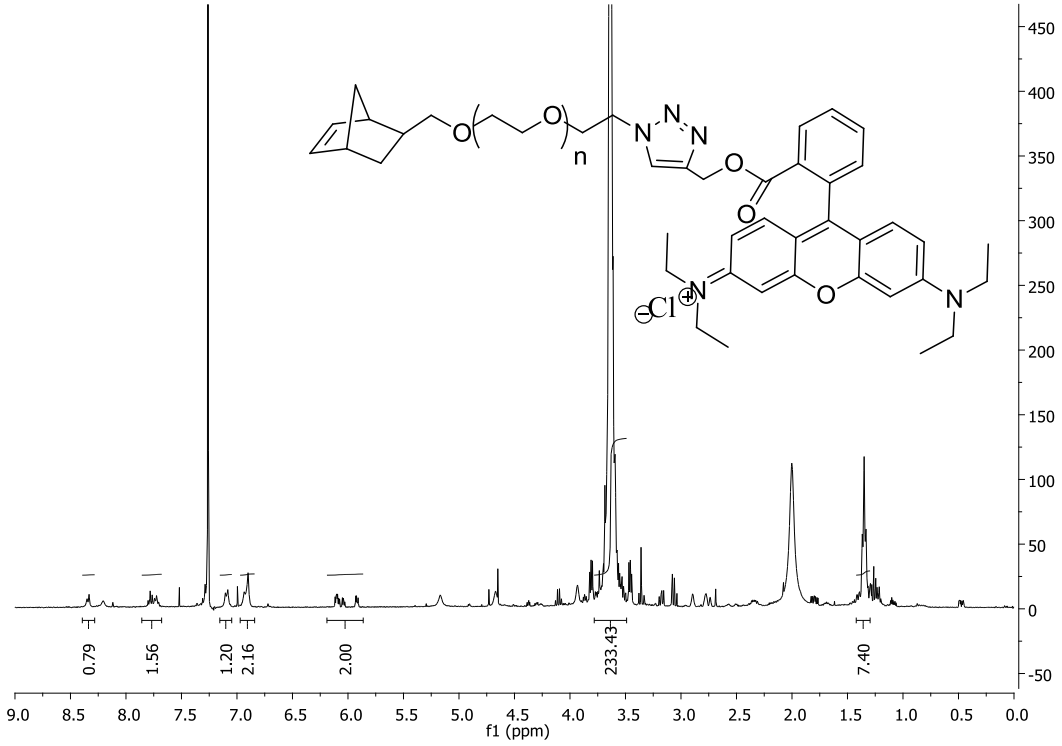
- α-norbornenyl-ω-glucosamine-poly(ethylene oxide) (8)



- Pentane-1,5-diyl dinorbornene



- α-norbornenyl-ω-Rhodamine-poly(ethylene oxide) (9)



S2: Calculation of the amount of active molecules per NP (Glucosamine; Rhodamine)

To determine the amount of active molecules per NP, the active molecule concentration in the latex is first calculated with the following equation:

$$C_i = \frac{\pi \times F_i \times n_{Macro;i} \times M_i}{m_{Nb} + \pi \times m_{Macro;i}}$$ (in gram of active molecule i per gram of latex)

(i = Glucosamine or Rhodamine)

With:

- C_i: concentration of active molecule i in the latex (in gram of active molecule i per gram of latex)
- π: conversion of macromonomer i
- F_i: ω functionalization of macromonomer i
- $n_{Macro;i}$: initial amount of macromonomer i
- M_i: molecular weight of active molecule i
- m_{Nb}: initial weight of norbornene
- $m_{Macro;i}$: initial weight of macromonomer i

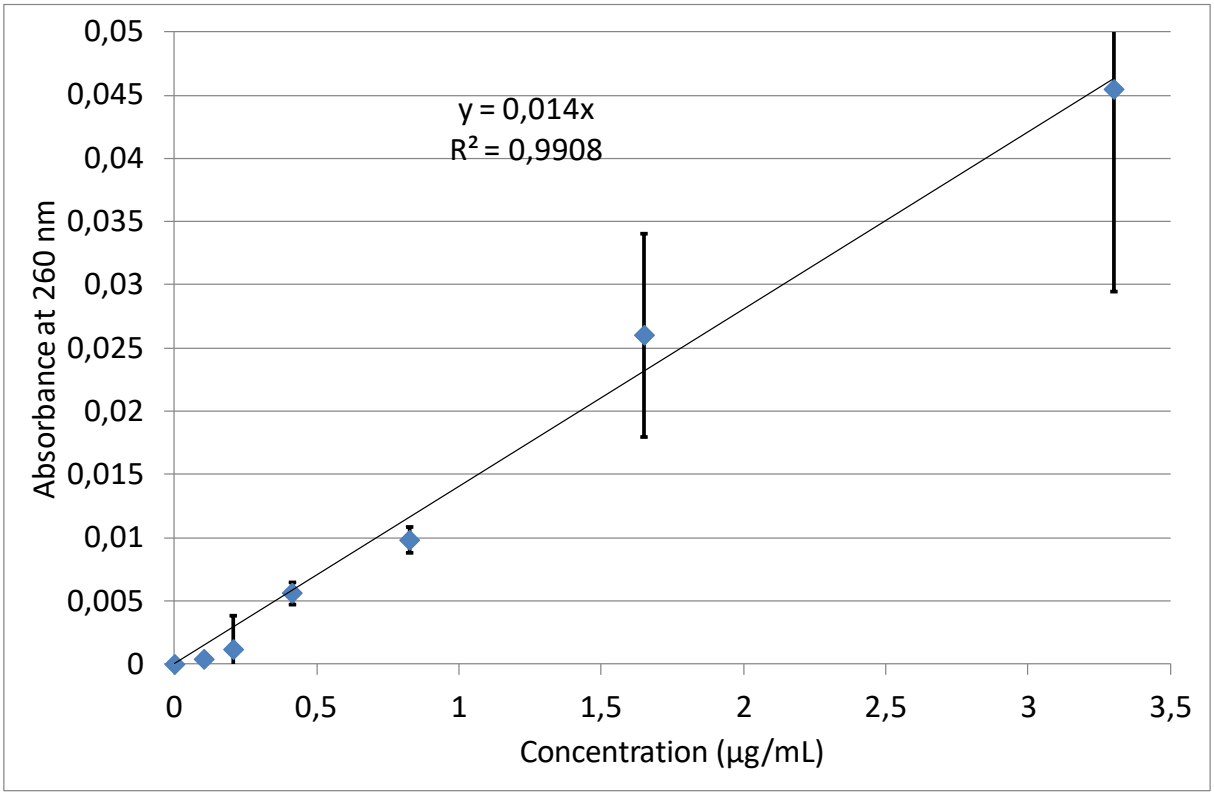
Then, the amount of molecule i per NP can be approximated with the following equation:

$$N_i/NP = \frac{C_i \times \rho_{NP} \times V_{NP} \times N_A}{M_i}$$ (molecules per NP)

With :

- N_i/NP: amount of molecule i per NP
- ρ_{NP}: latex density approximated to equal to 1 g/mL
- V_{NP}: volume of a NP ($V_{NP}=\pi D_{NP}^3/6$) (D_{NP}: diameter of a NP measured by DLS)
- N_A: Avogadro number
- M_i: molecular weight of active molecule i

S3: UV calibration curve Absorbance at 260 nm vs oligoDNA concentration



S4: Calculation of the amount of entrapped oligoDNA molecules per NP

The amount of entrapped oligoDNA molecules per NP is calculated with the following equation:

$$N_{oligoDNA}/NP = \frac{\%_{ent} \times V_{NP} \times \rho_{NP} \times [oligoDNA] \times V_{oligoDNA} \times N_A}{M_{oligoDNA} \times [m_{Nb} + \pi_{CL} \times m_{CL} + \pi_{Macro} \times m_{Macro}]}$$

With:

- $\%_{ent}$: percentage of entrapped oligoDNA molecules during the reaction
- $N_{oligoDNA}$/NP: the amount of entrapped oligoDNA molecules per NP
- ρ_{NP}: latex density approximated to equal to 1 g/mL
- V_{NP}: volume of a NP ($V_{NP}=\pi D_{NP}^3/6$) (D_{NP}: diameter of a NP measured by DLS)
- [oligoDNA]: concentration of of oligoDNA solution (1445 µg/mL)
- $V_{oligoDNA}$: volume of the oligoDNA solution injected during the reaction
- N_A: Avogadro number
- $M_{oligoDNA}$: molecular weight of the oligoDNAs
- m_{Nb}: initial weight of norbornene
- π_{CL}: conversion of the crosslinker
- m_{CL}: initial weight of crosslinker
- π_{Macro}: conversion of the macromonomer
- m_{Macro}: initial weight of macromonomer

S5: ACSF preparation

products	Concentration (mM)
NaCl	130.5
KCl	2.4
$MgSO_4;7H_2O$	1.3
KH_2PO_4	1.2
HEPES	1.25
$CaCl_2$	2.4
Glucose	10
$NaHCO_3$	19.5

The final NPs concentration in the ACSF medium ($[NPs]^f_{ACSF}$; NPs/mL) can be calculated with the following equation:

$$[NPs]^f_{ACSF} = \frac{(m_{Nb} + \pi_{CL} m_{CL} + \pi_{macro} m_{macro})}{V_{NP} \rho_{NP} V_{ACSF}}$$

With:

- m_{Nb}: initial weight of norbornene
- π_{CL}: conversion of the crosslinker
- m_{CL}: initial weight of crosslinker
- π_{Macro}: conversion of the macromonomer
- m_{Macro}: initial weight of macromonomer
- ρ_{NP}: latex density approximated to equal to 1 g/mL
- V_{NP}: volume of a NP ($V_{NP}=\pi D_{NP}^3/6$) (D_{NP}: diameter of a NP measured by DLS)
- V_{ACSF}: volume of ACSF solution

And the values of these concentrations for each system are summarized in the following table:

System	NP-OH	NP-OH-CL 5w-%	NP-GA
$[NPs]^f_{ACSF}$ (NPs/mL)	$5.5\ 10^{11}$	$2.4\ 10^{11}$	$4.1\ 10^{11}$