Electronic Supplementary Material (ESI) for Polymer Chemistry.

Redox-Triggered Hydrogels Revealing Switchable Stiffness Properties and Shape-Memory Functions

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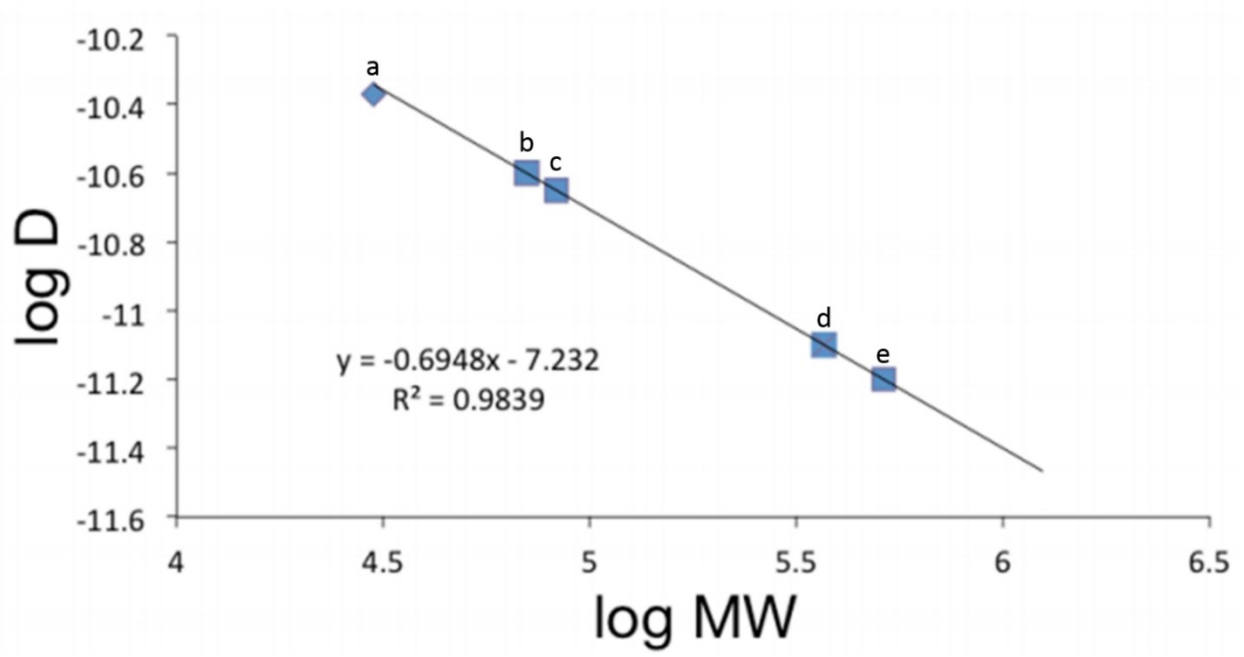
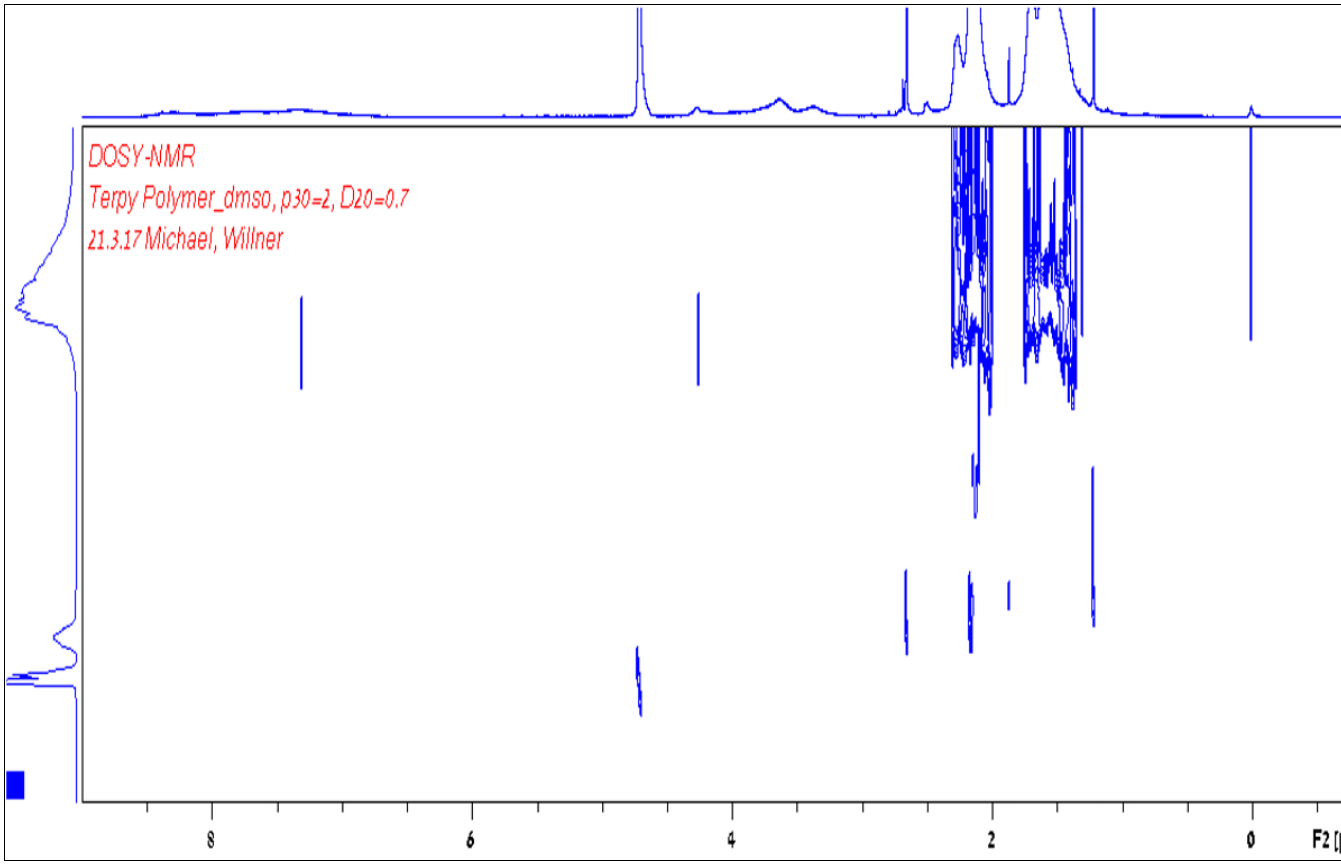
Evaluation of the average molecular weight of the terpyridine-modified poly-acrylamide chains.

Figure S1: (A) Calibration curves corresponding to the diffusion coefficients of a series of polymers of known average molecular weights: (a) Poly(acrylic acid) (MW ~ 35,000 Da) (b) Poly(acrylic acid), sodium salt (MW ~ 70,000 Da) (c) Poly(acrylic acid), sodium salt (MW ~ 85,000 Da) (d) Poly(acrylic acid) (MW ~ 345,000 Da) (e) Poly(acrylamide-co-acrylic acid) (MW ~ 520,000 Da). The diffusion coefficients of the respective polymers were derived by recording the DOSY spectrum of each of the polymers. (B) The DOSY NMR spectrum of the terpyridine-functionalized polyacrylamide polymer chains. The experimental logarithm of the diffusion coefficient, log(D) = -11, was used to deduce the molecular weight of the polymer (MW = 265,000 Da) using the calibration curve presented in (A).

(A)

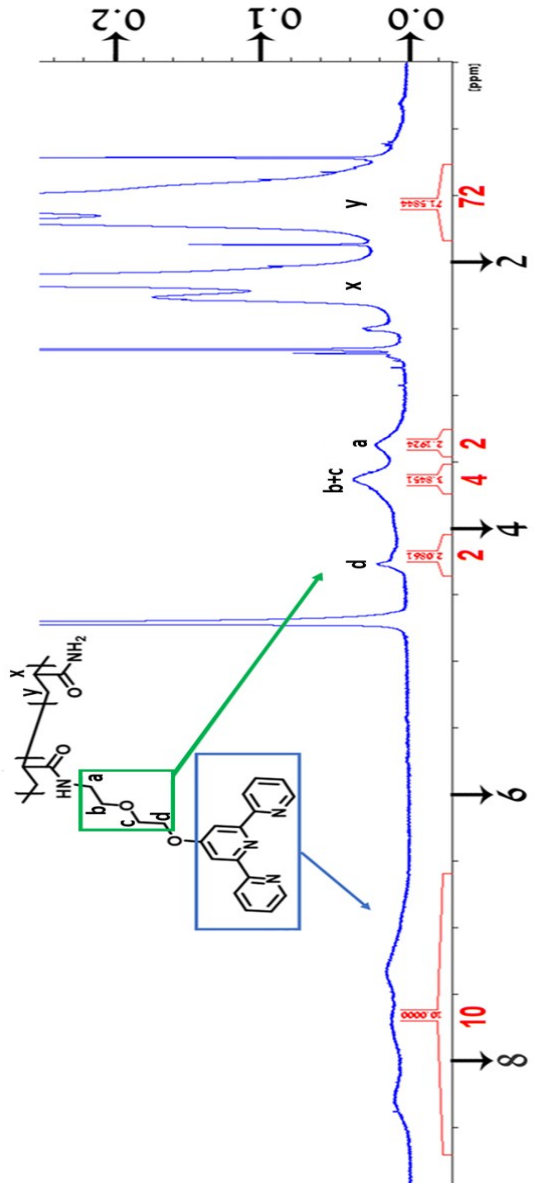


(B)


DOSY-NMR
Terpy Polymer_dmso, p30=2, D20=0.7
21.3.17 Michael, Willner
8
6
4
2
0
F2 (

Evaluation of the loading of the polyacrylamide chains with the terpyridine ligands.

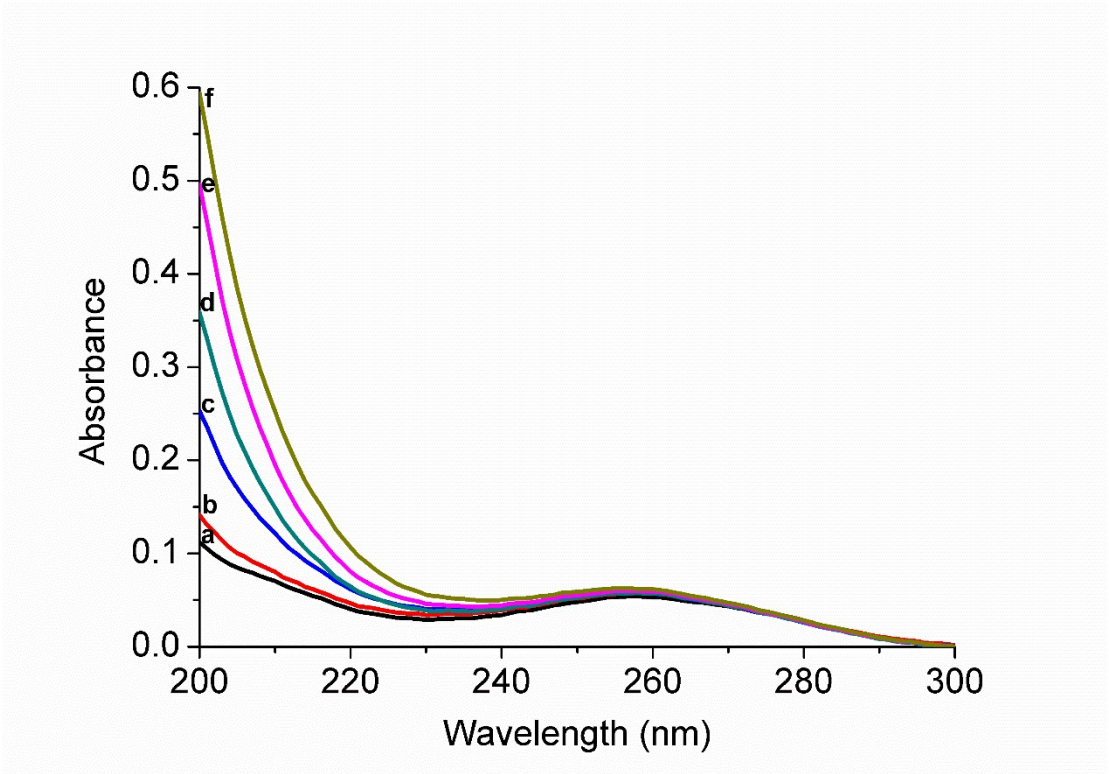
Figure S2: ^{1}H NMR spectrum corresponding to the terpyridine functionalized polyacryl[illegible]ctive proton bands associated[illegible]spectrum) and the CH_2 grou[illegible] blue) the ratio of ligand:acr[illegible]



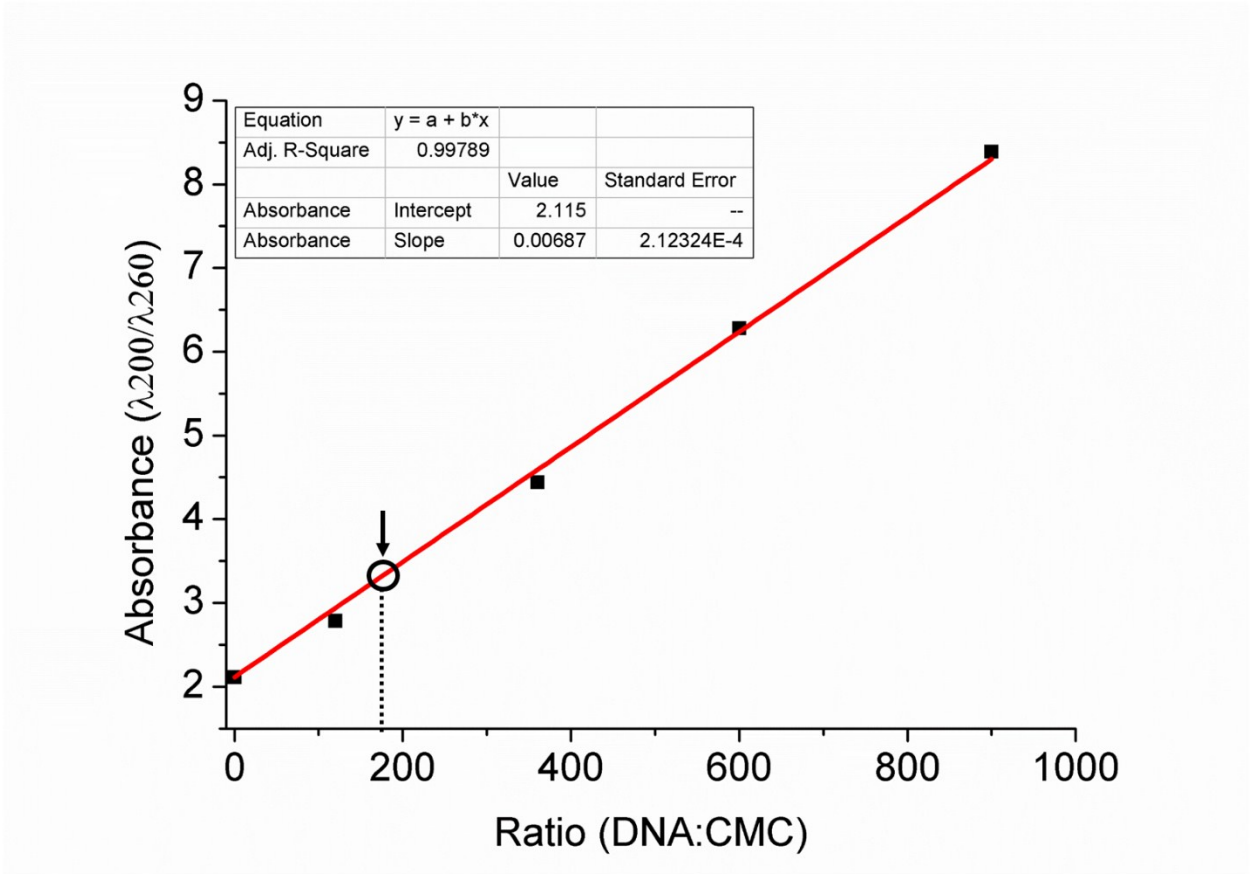
Evaluation of the loading of the nucleic acid tethers on the carboxymethylcellulose.

Figure S3: (A) Absorbance spectra corresponding to the addition of variable amounts of carboxymethylcellulose (MW 250,000) to a fixed concentration of the nucleic acid (**i**), 500 nM: (a) 0 μM (b) 0.1 μM (c) 0.3 μM (d) 0.5 μM (e) 0.75 μM (f) 1 μM. (B) Calibration curve corresponding to absorbance ratio λ_{200} nm/λ_{260} nm as a function of the molar ratio DNA: carboxymethylcellulose units. The circle marked with an arrow corresponds to the λ_{200} nm/λ_{260} nm value of the polymer P_B. The calibration curve indicates a molar ratio of the nucleic acid and carboxymethylcellulose units that corresponds to 1:180.

(A)



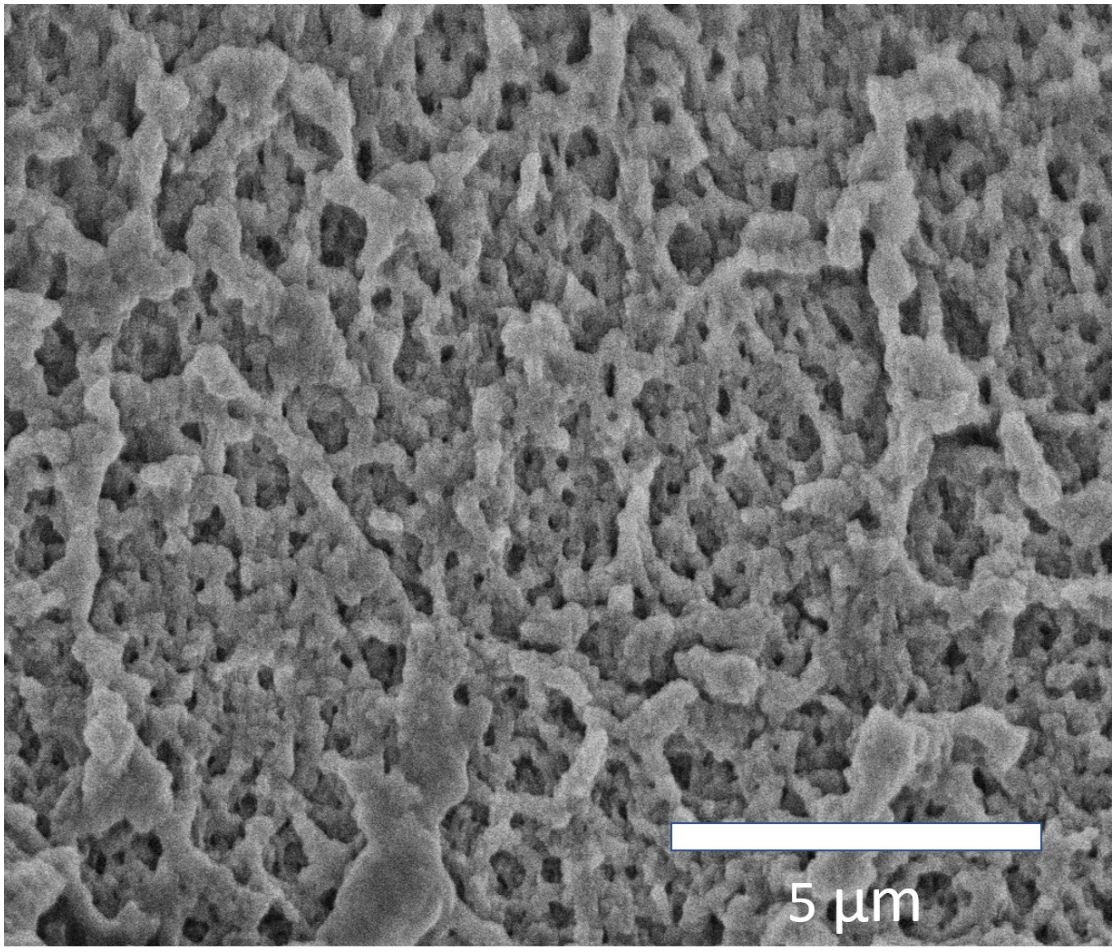
(B)


Equation
y = a + b*x
Adj. R-Square
0.99789
Value
Standard Error
Absorbance
Intercept
2.115
--
Absorbance
Slope
0.00687
2.12324E-4
Absorbance (λ200/λ260)
Ratio (DNA:CMC)
0
200
400
600
800
1000
2
3
4
5
6
7
8
9

SEM images of the Ru^{2+}- and Ru^{3+}-crosslinked carboxymethylcellulose matrices

Figure S4: SEM images corresponding to: (A) The Ru^{3+}-crosslinked carboxymethyl cellulose hydrogel. (B) The Ru^{2+}-crosslinked carboxymethyl cellulose hydrogel.

(A)



(B)