Supplementary information

for

Mesomorphic Ionic Hyperbranched Polymers: Effect of Structural Parameters on Liquid-Crystalline Properties and on the Formation of Gold Nanohybrids.

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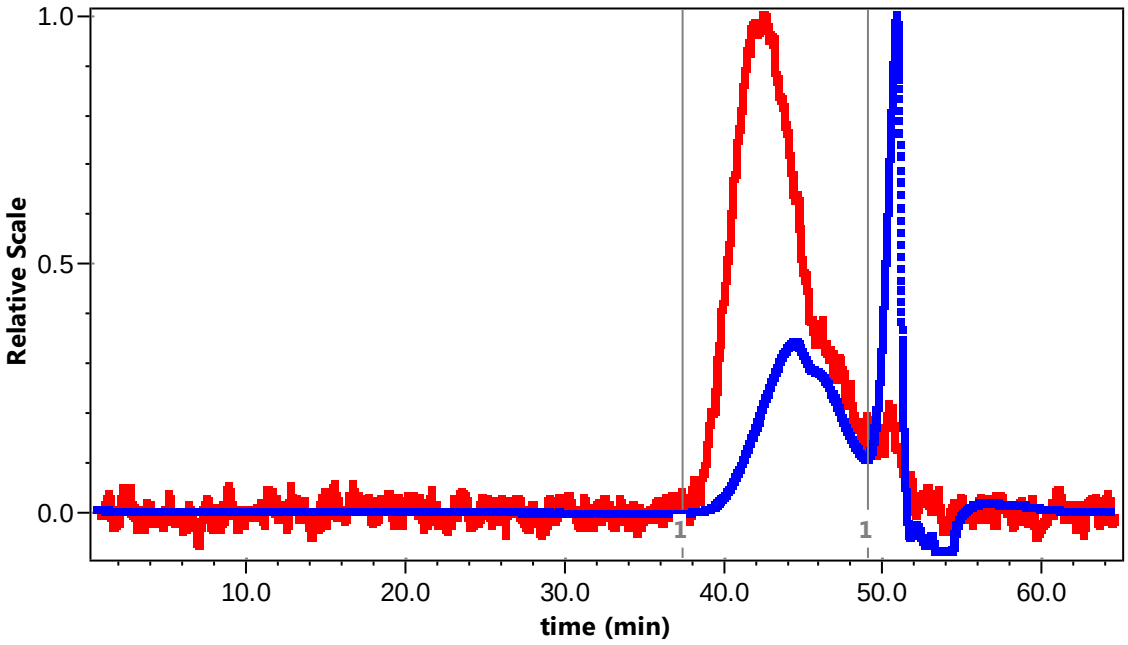

Figure S1. SEC chromatogram of HYPAM4 in carbonate buffer at pH 10 (in red: light-scattering detection, in blue: refractometry detection). The first peak observed with refractometry detection could be attributed to solvent.

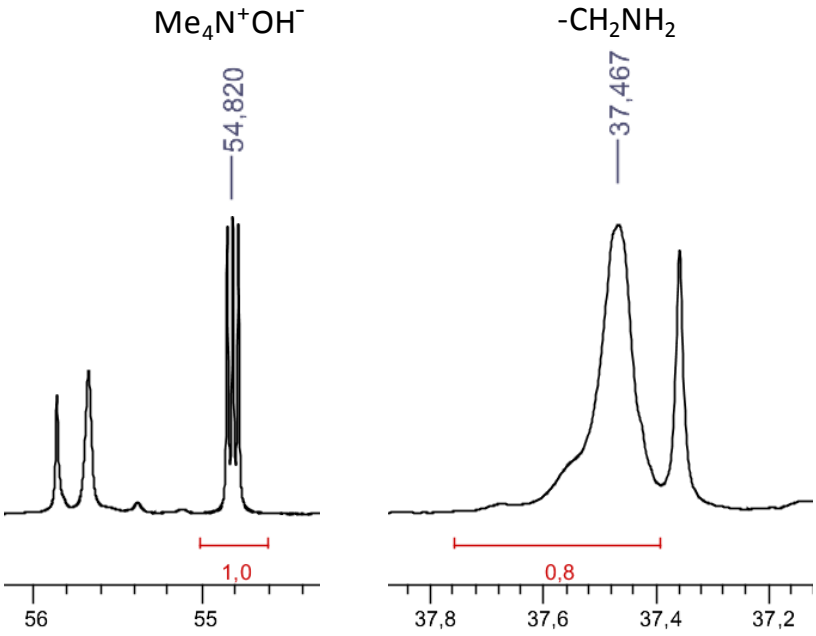

Figure S2. Quantitative ^{13}C NMR spectrum of HYPAM4 (500 MHz, D_2O, Me_4NOH was used as a calibration compound).

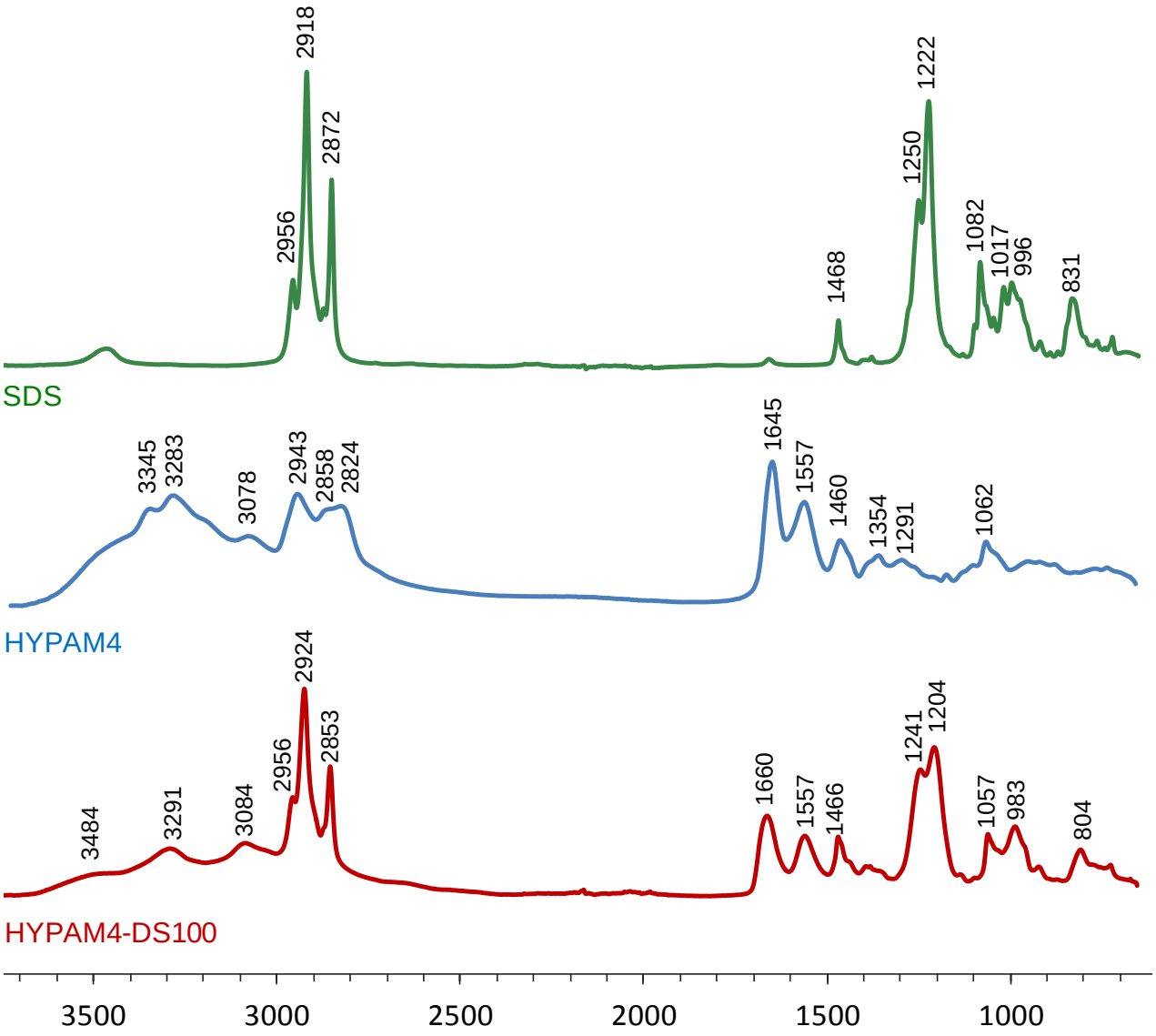

Figure S3. ATR-FTIR spectra of SDS, HYPAM4 and HYPAM4-DS100 complex.

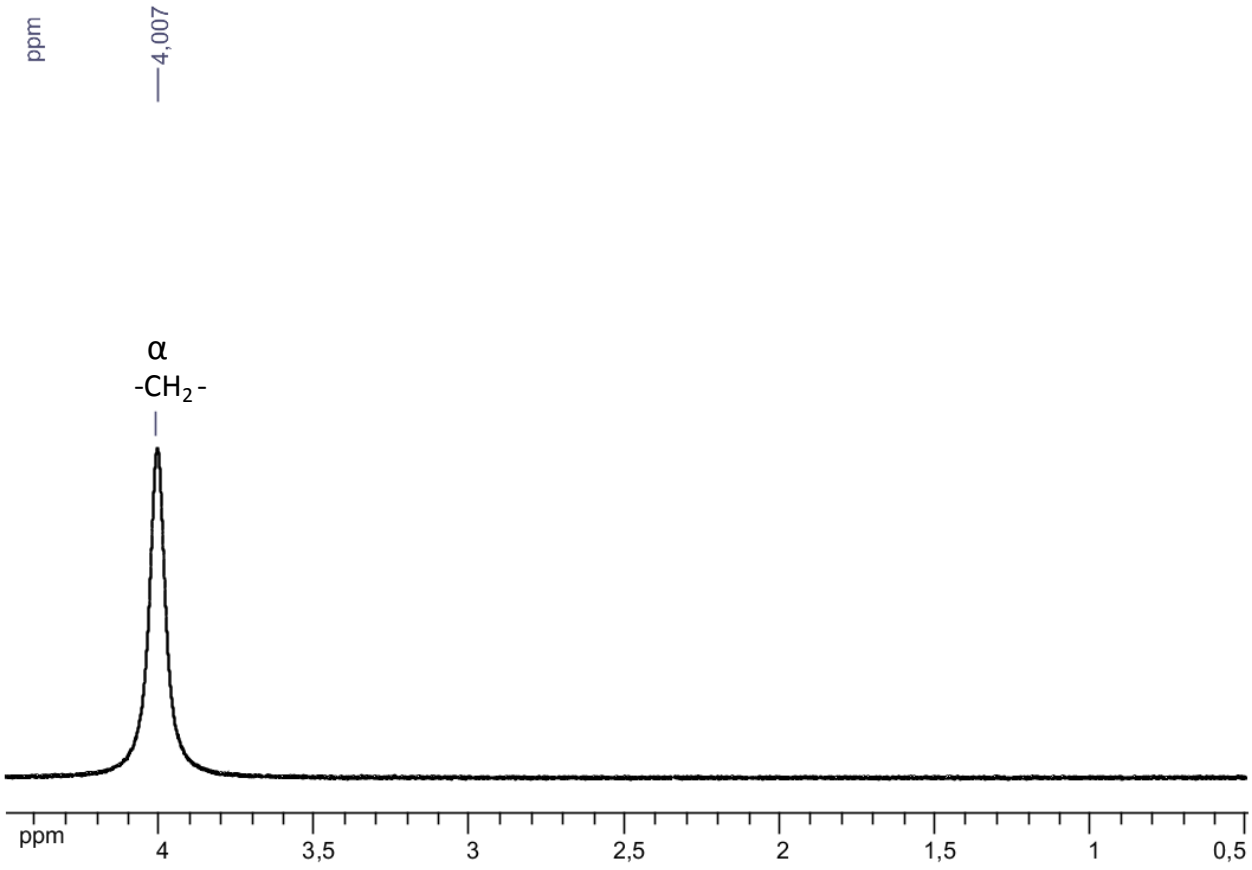

Figure S4. 1D 1H NOESY experiment with HYPAM4-DS100 in $CDCl_3$: selective excitation of methylene group in α position of sulfate function (NOE mixing time : 800 ms).

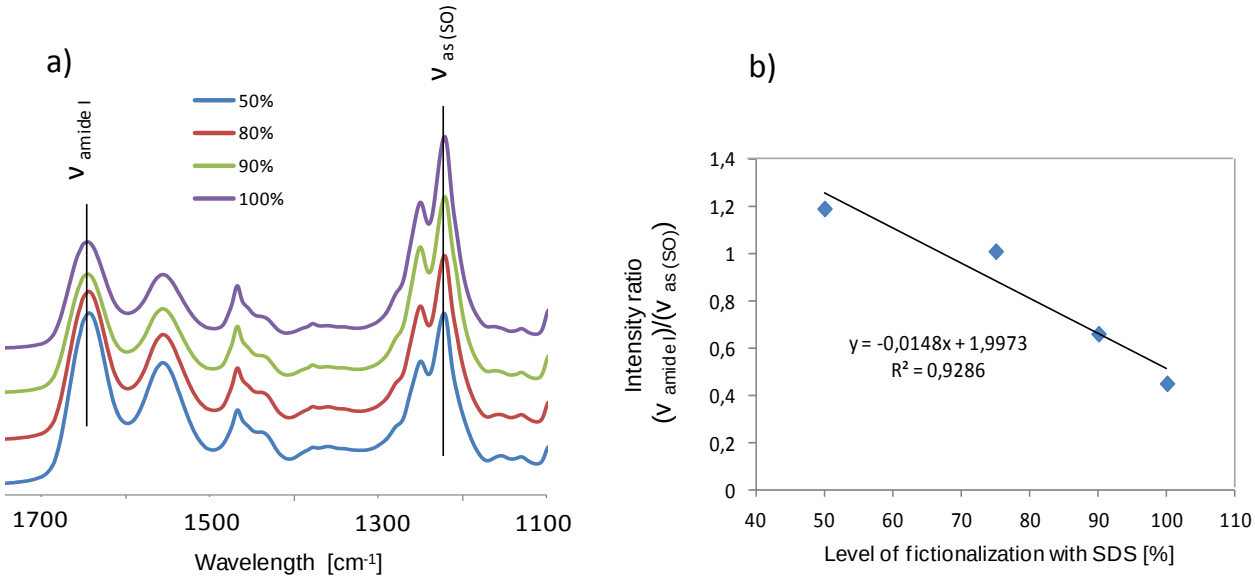

Figure S5. a) FTIR spectra of physical mixture of HYPAM4 and SDS. The quantity of SDS added correspond to a degree of functionalization of 50, 80, 90 and 100% of the total amine functions; b) Corresponding calibration corresponding to the intensity ratio of the intensity of the amide I band at 1660 cm^{-1} to the intensity of the sulfate band at 1204 cm^{-1} as a function of SDS content.

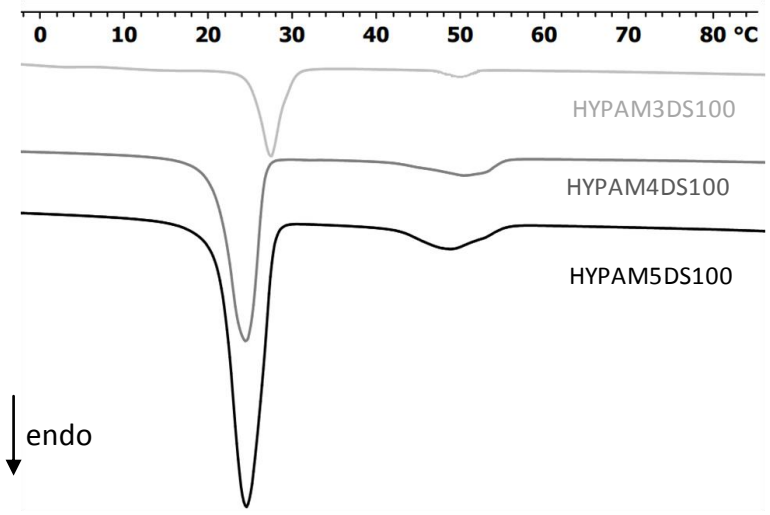

Figure S6. DSC thermogram recorded on heating at the rate of 10°C/min for HYPAM3DS100, HYPAM4-DS100 and HYPAM5-DS100.

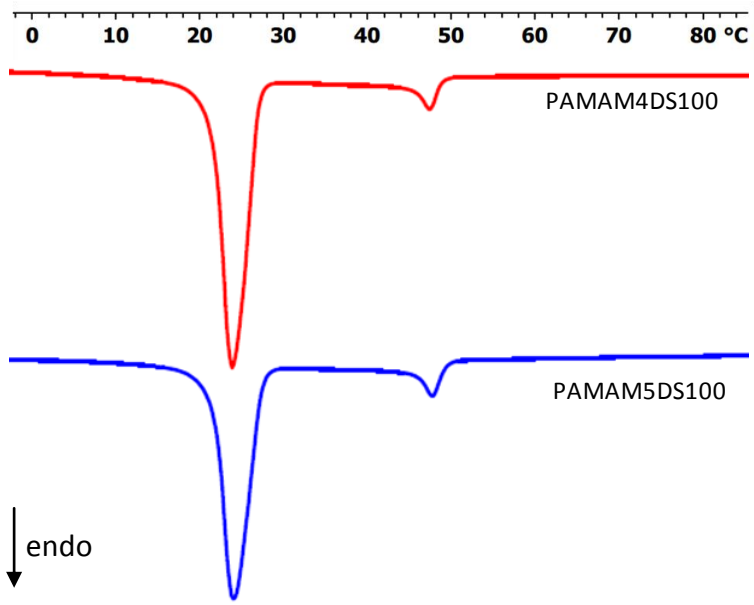

Figure S7. DSC thermogram recorded on heating at the rate of 10°C/min for PAMAM4-DS100 and PAMAM5-DS100.

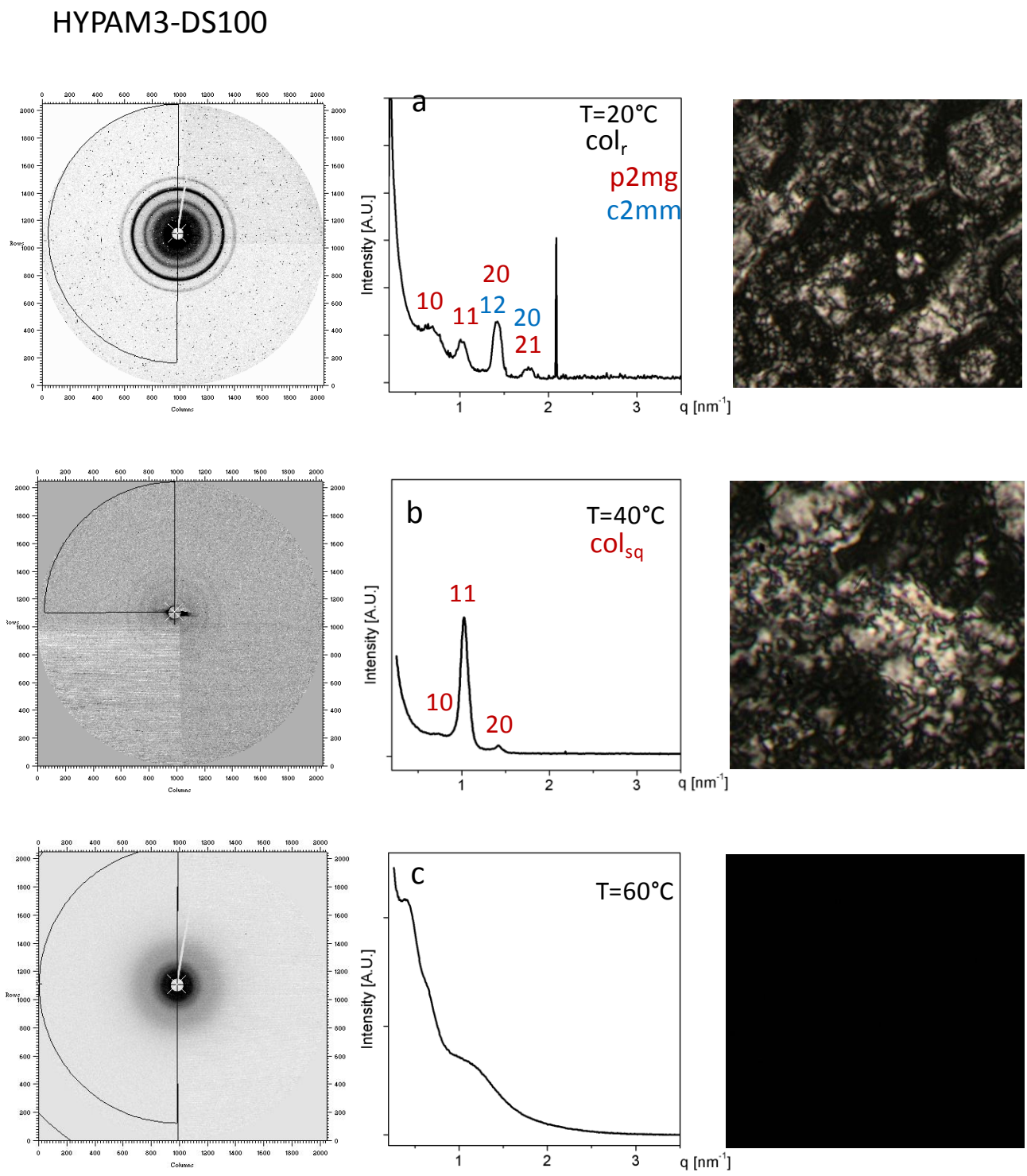

Figure S8. Diffraction intensity profile extracted from SAXS diffraction pattern for HYPAM3-DS100 at 20°C (Col_{sq}), 40°C (Lamellar) and 63°C (Isotrope) and corresponding POM images

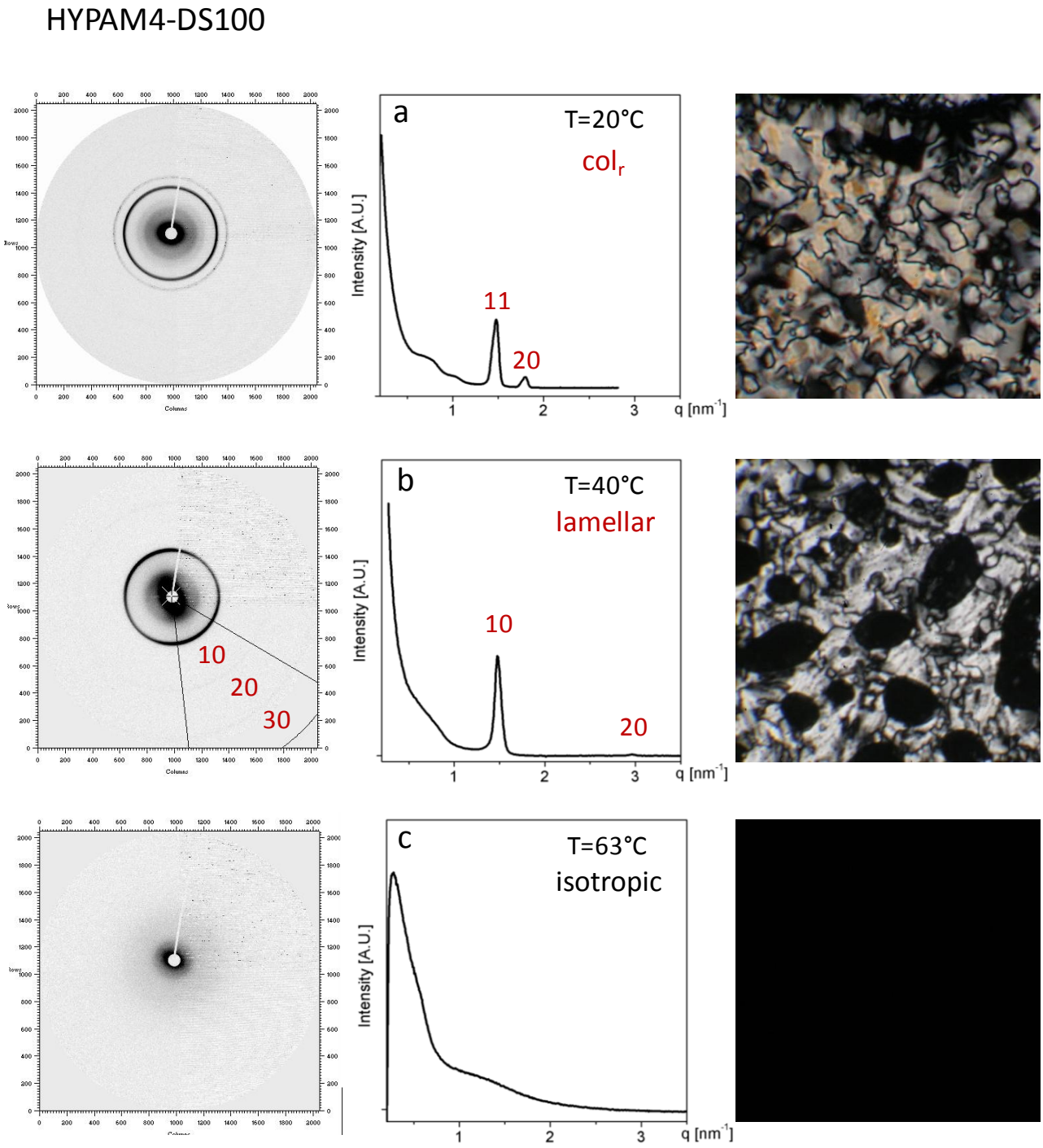

Figure S9. Diffraction intensity profile extracted from SAXS diffraction pattern for HYPAM4-DS100 at 20°C (Col$_r$), 40°C (Lamellar) and 63°C (Isotropic) and corresponding POM images.

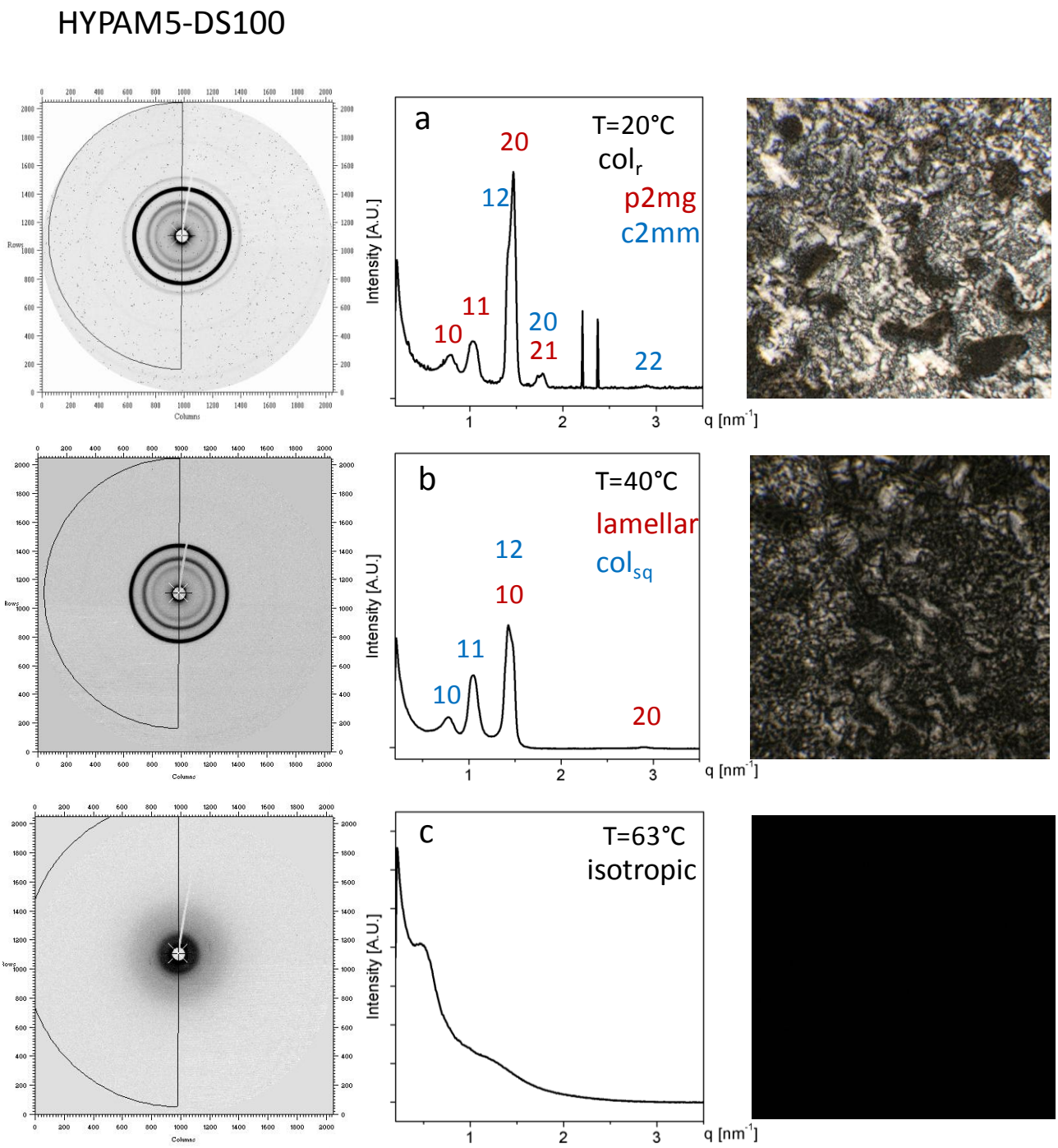

Figure S10. Diffraction intensity profile extracted from SAXS diffraction pattern for HYPAM5-DS100 at 20°C (Col_r), 40°C (Lamellar) and 63°C (Isotropic) and corresponding POM images.

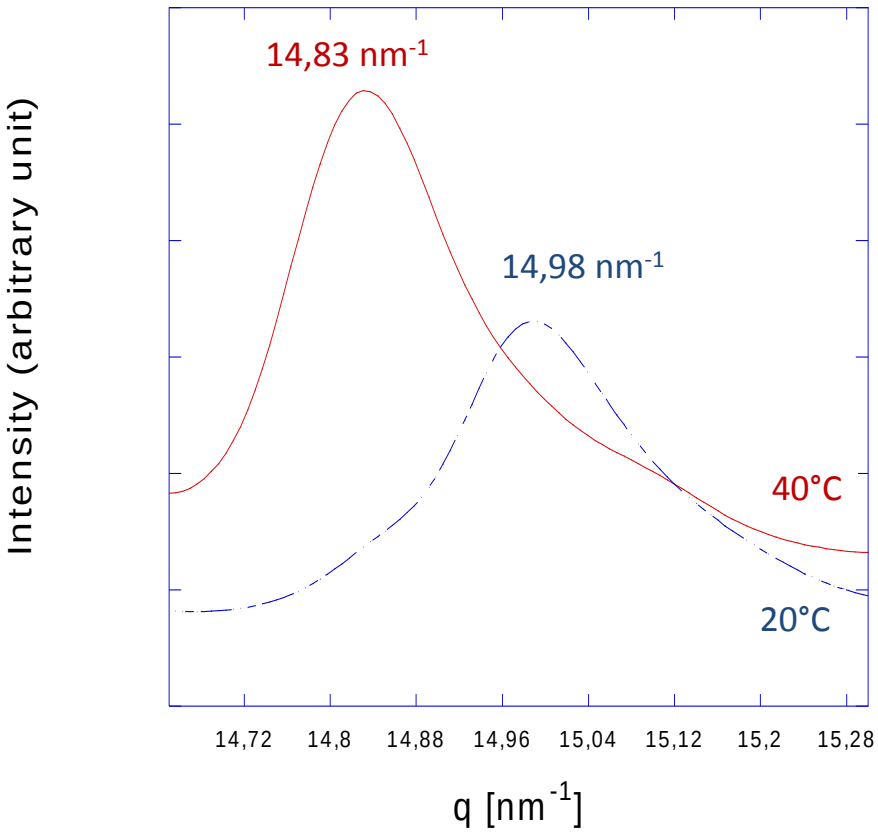

Figure S11. Diffraction intensity profile extracted from diffraction pattern in the wide angle region for HYPAM4-DS100 at 20°C (Col_r) and 40°C (Lamellar) showing the shift of the surfactants domains at the first transition temperature towards low q regions at higher temperature i.e. to less organized domains.

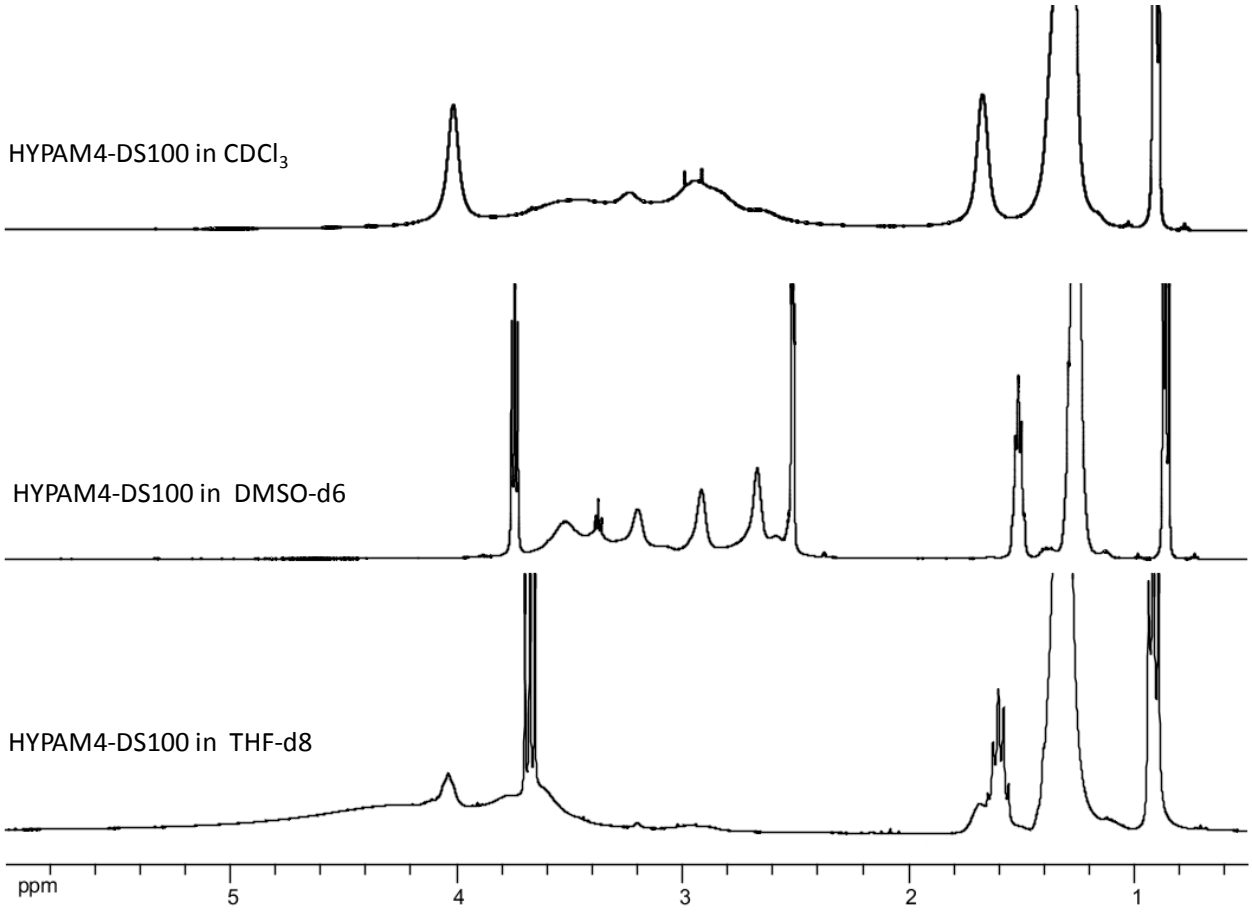

Figure S12. ^{1}H NMR of HYPAM4-DS100 in $CDCl_3$, DMSO-d6 and THF-d8 (500 MHz)

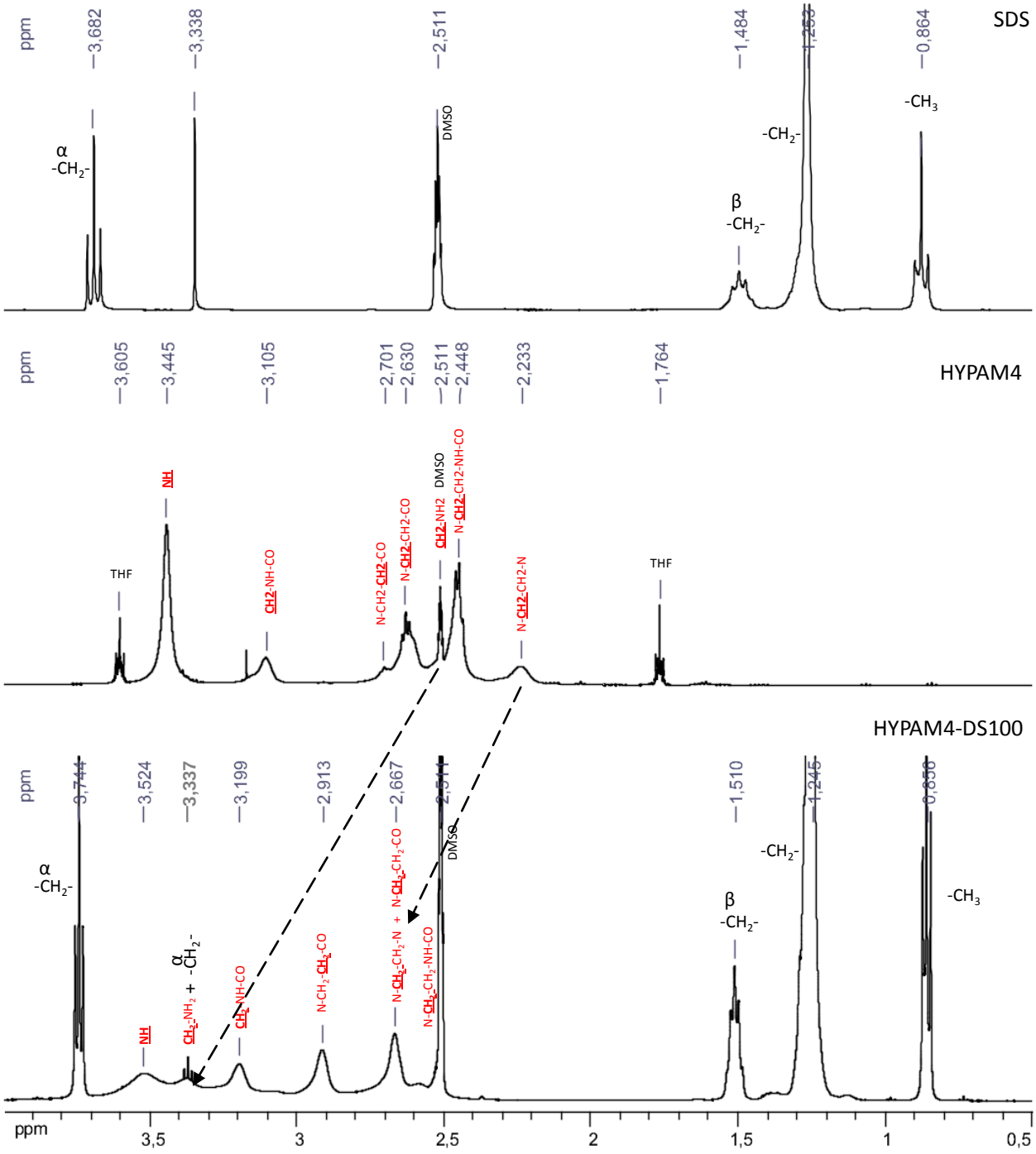

Figure S13. ^{1}H NMR of HYPAM4 and HYPAM4-DS100 (500 MHz, DMSO-d6, 308K)

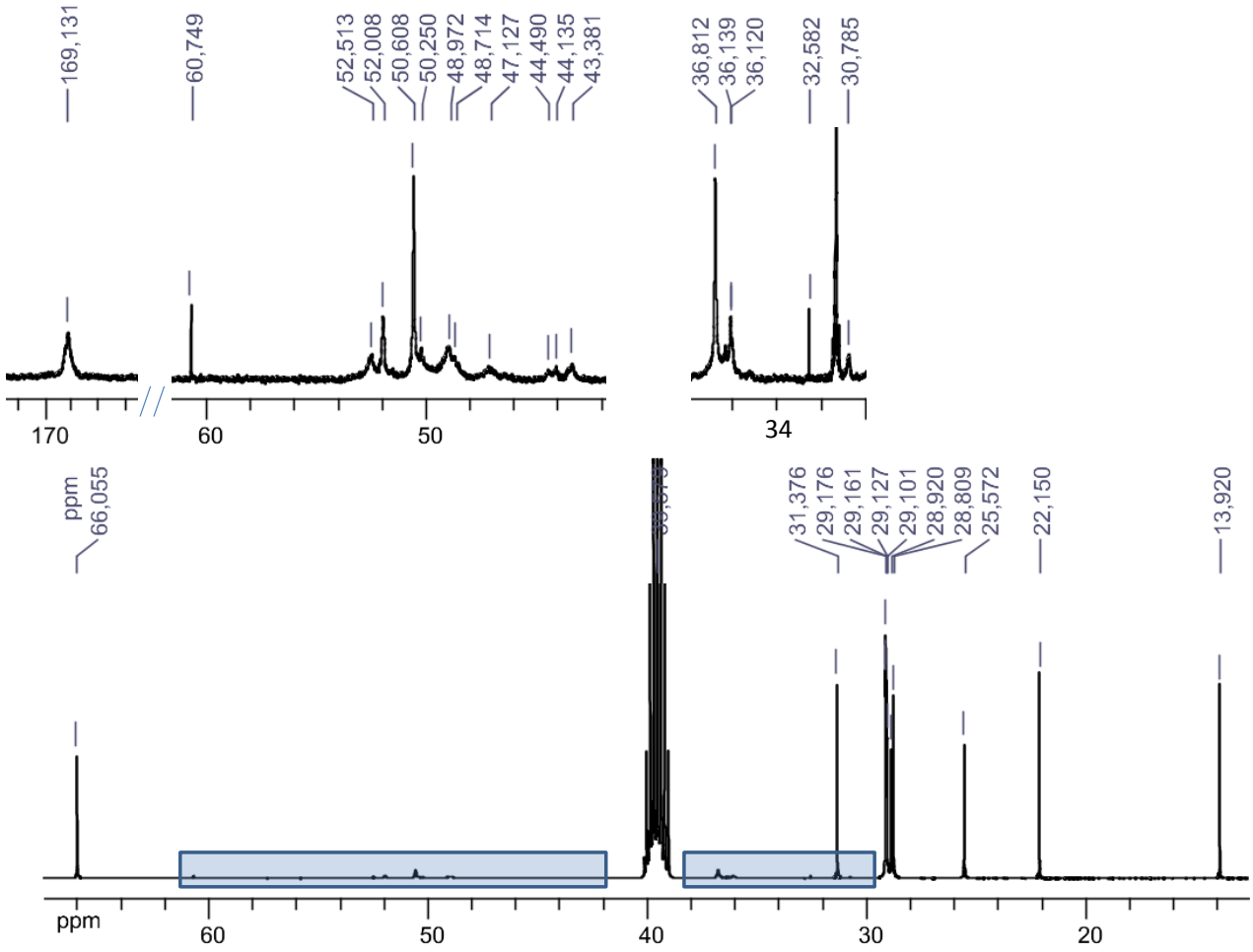

Figure S14. ^{13}C NMR of HYPAM4-DS100 (500 MHz, DMSO-d6, 308K)

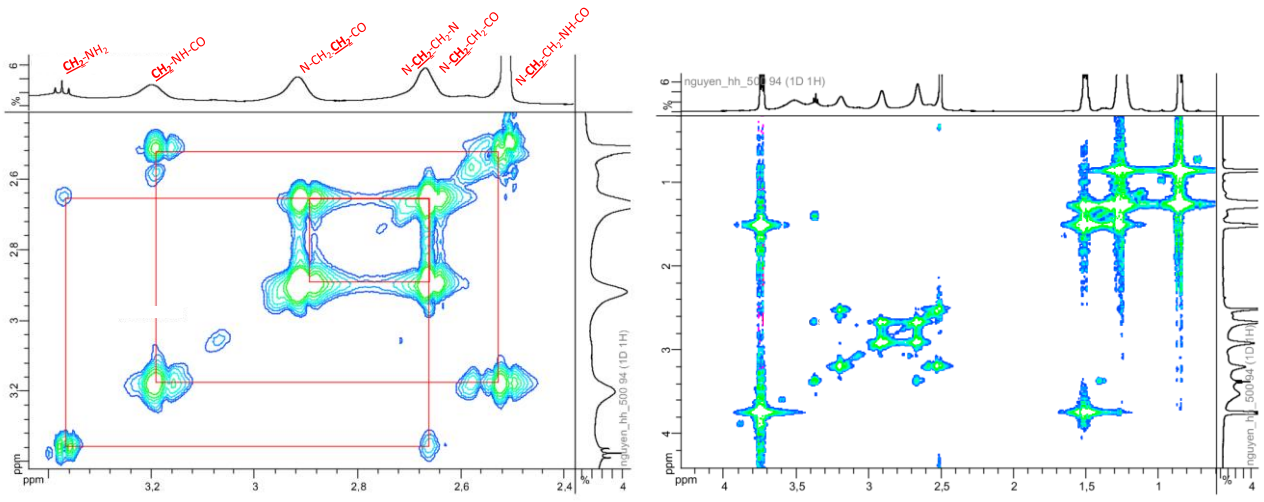

Figure S15. COSY-NMR of HYPAM4-DS100 (500 MHz, DMSO-d6, 308K)

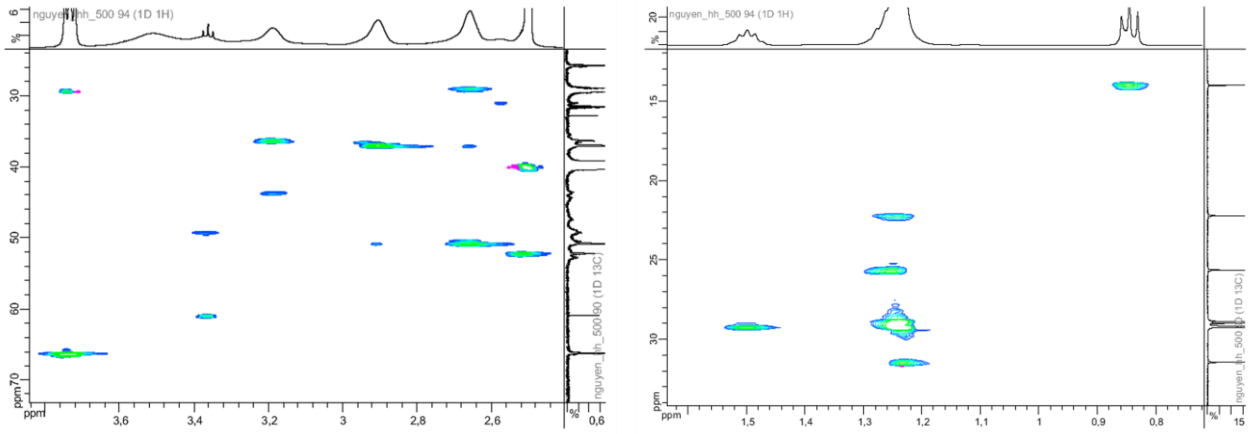

Figure S16. HSQC NMR of HYPAM4-DS100 (500 MHz, DMSO-d6, 308K)

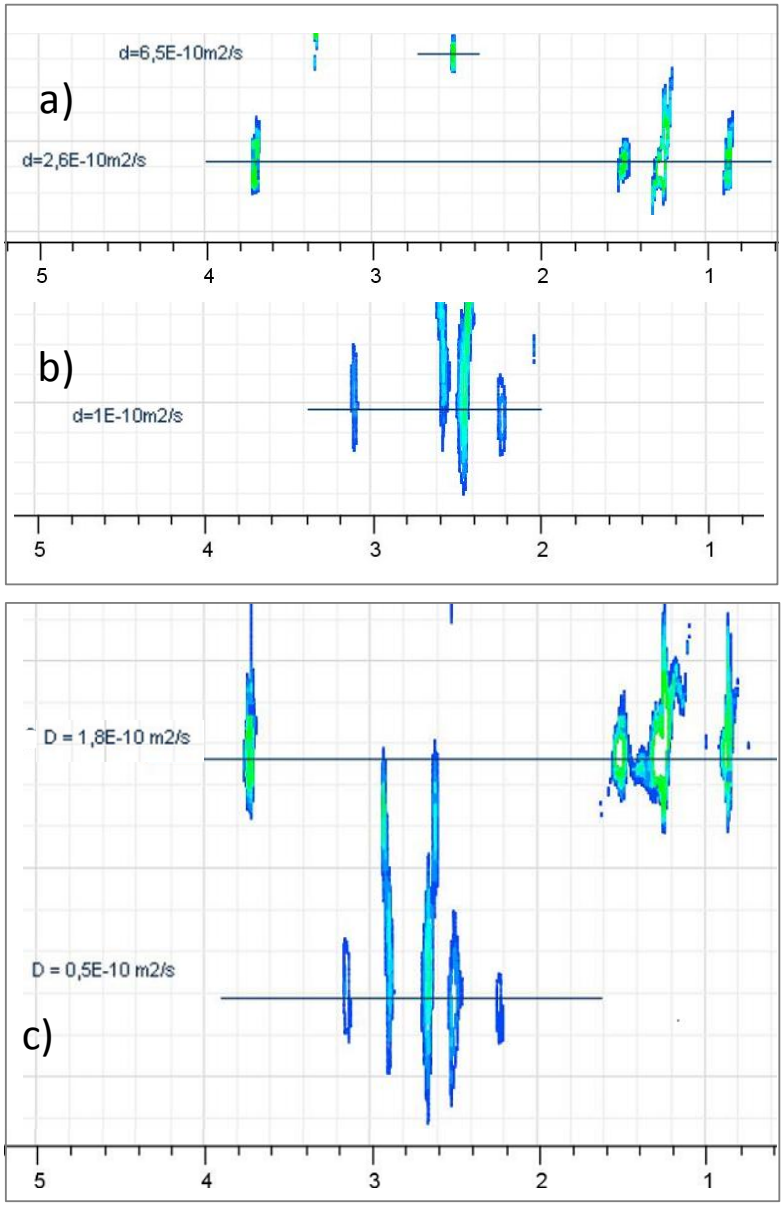

Figure S17. PGSE-NMR spectra of SDS (a) HYPAM4 (b) and HYPAM4DS100 (c) in DMSO at 308K with evaluated diffusion coefficients.

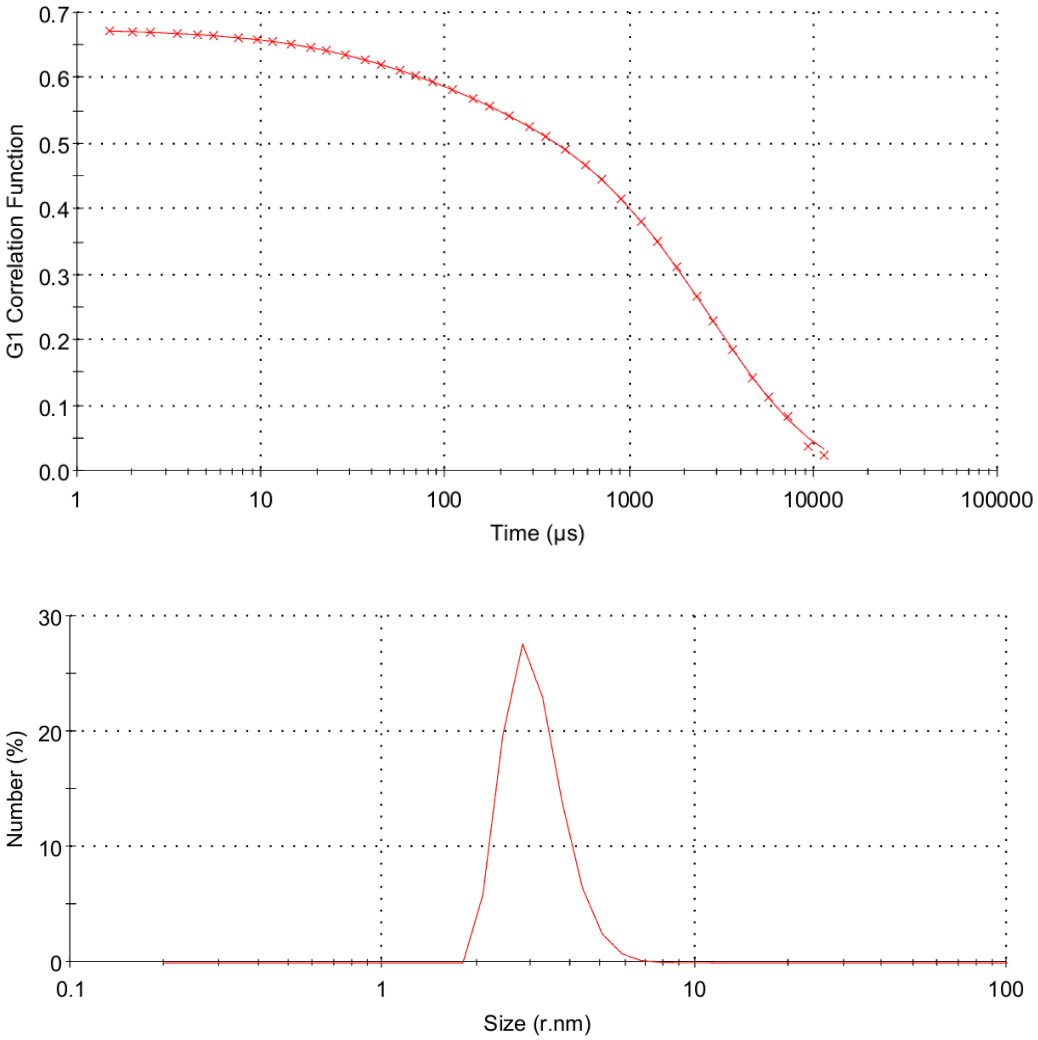

Figure S18. Correlation function and size distribution by number for HYPAM4-DS100 in DMSO at 308K.

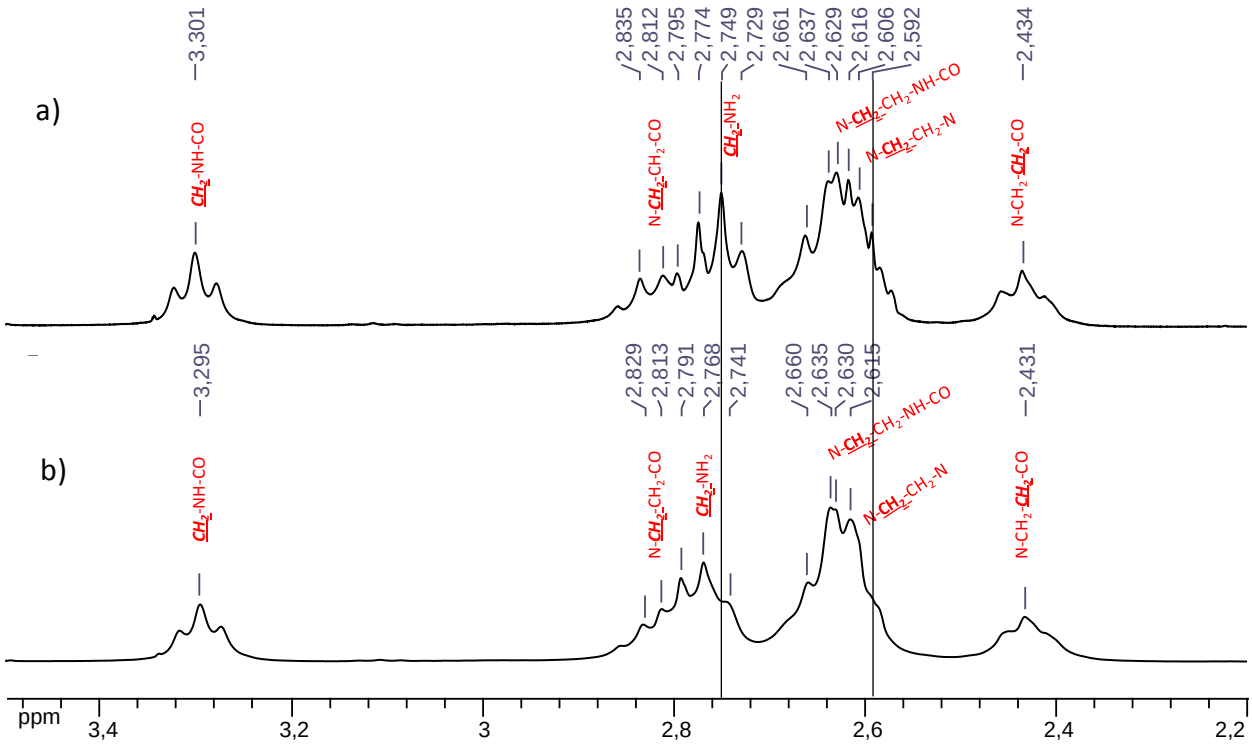

Figure S19. ^{1}H NMR spectra of a) HYPAM4 and b) HYPAM4-$HAuCl_4$ in D_2O (300 MHz)

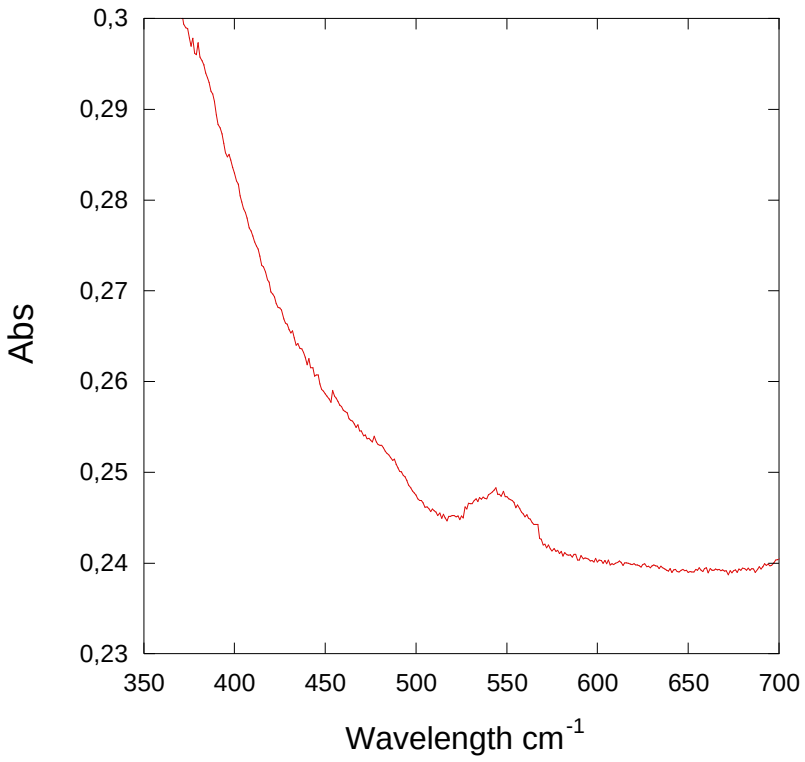

Figure S20. UV-reflection spectrum of AuNps formed in lamellar phase of HYPAM4-DS100

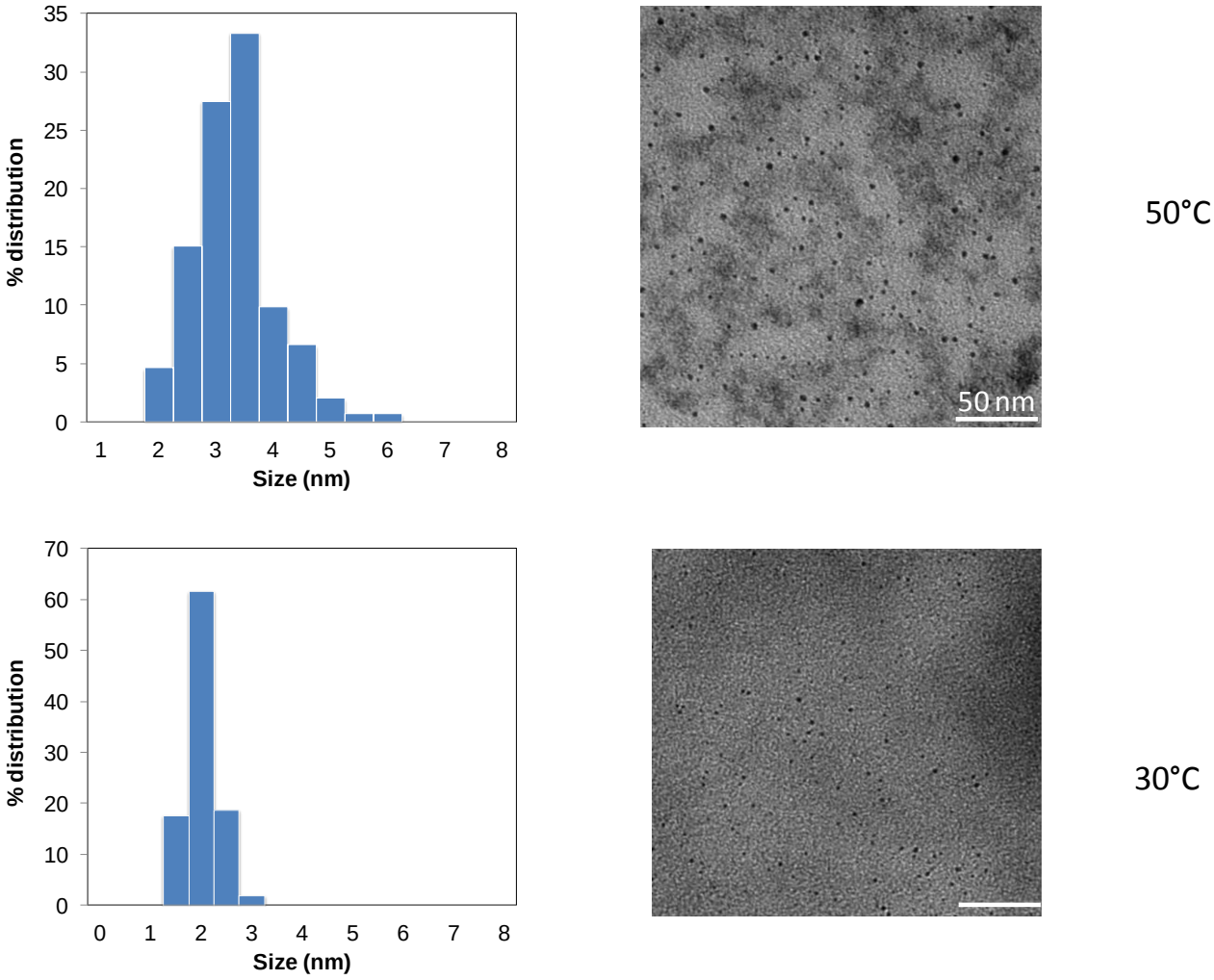

Figure S21. TEM micrographs of AuNPs synthesized in HYPAM4-DS100 phase at 30°C and at 50°C.

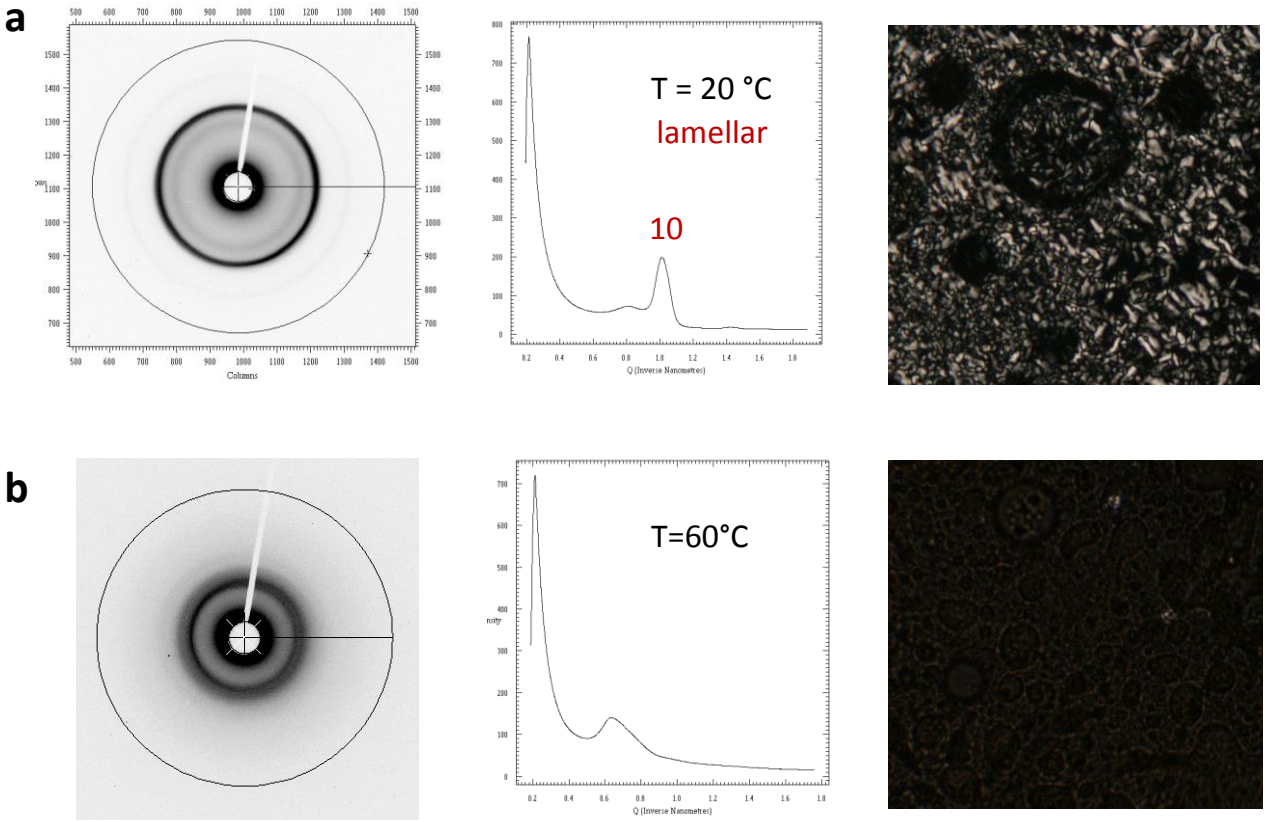

Figure S22. HYPAM4-DS100@AuNPs synthesized at 30°C: diffraction intensity profile extracted from SAXS diffraction pattern and corresponding POM images a) at 20°C (LC lamellar state) and b) at 60 °C (isotropic state).

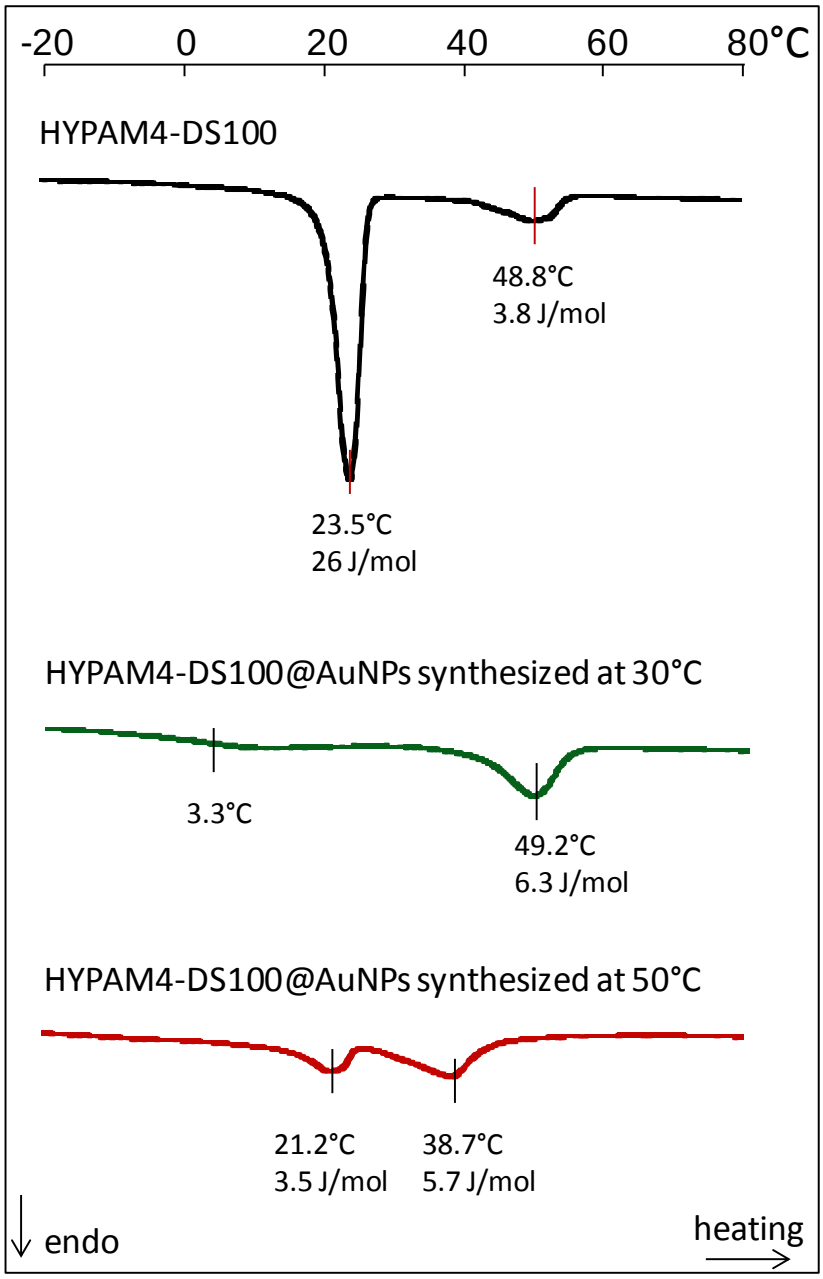

Figure S23. DSC thermograms recorded on heating at the rate of 10°C/min for HYPAM4-DS100 (black line), HYPAM4-DS100 with AuNps synthesized at 30°C and 50°C (green and red line respectively).

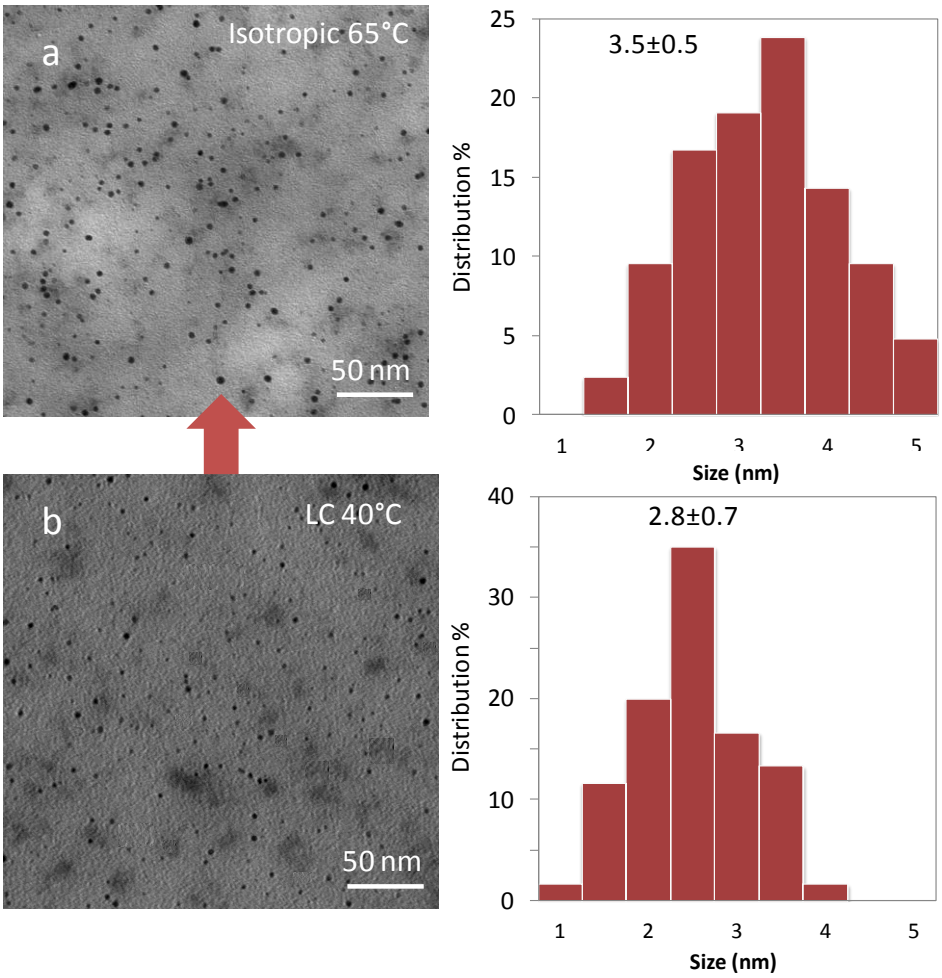

Figure S24. TEM micrographs of AuNPs synthesized in HYPAM3-DS100 phase either (a) in isotropic condition at 65°C or (b) in a lamellar liquid crystalline state at 40°C with corresponding size distribution

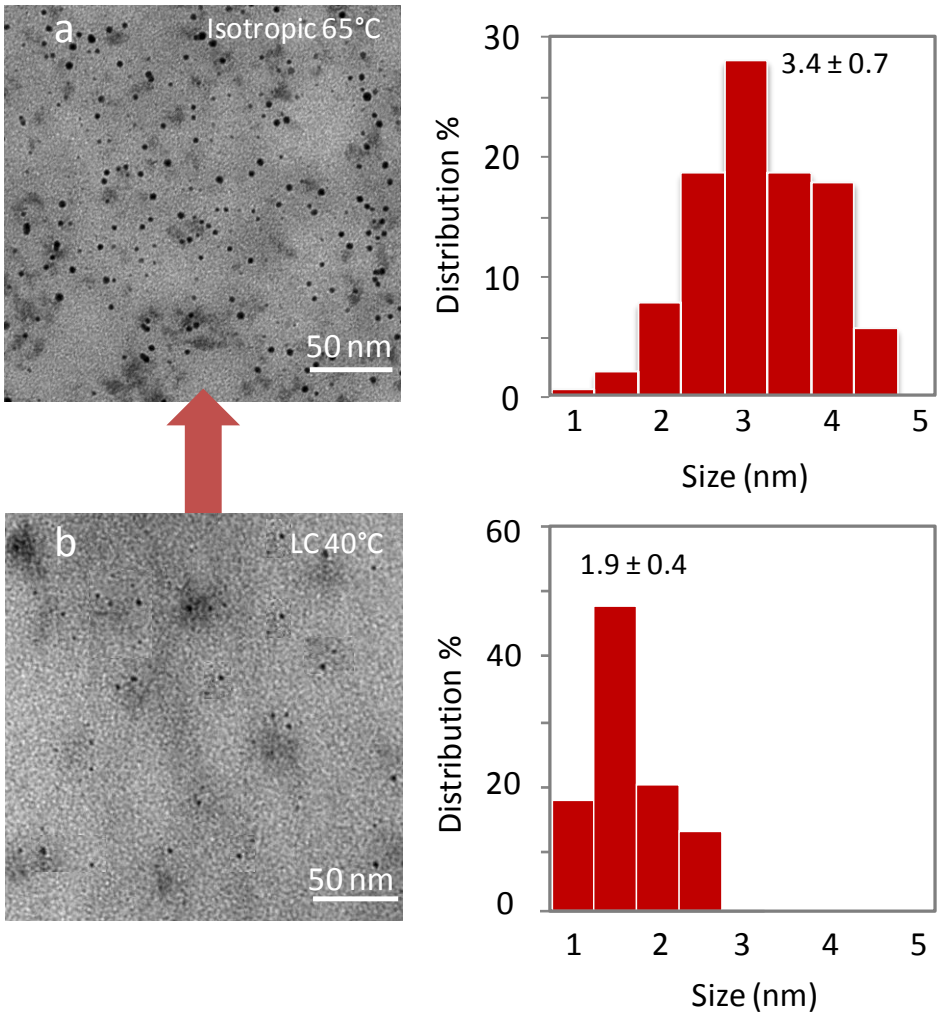

Figure S25. TEM micrographs of AuNPs synthesized in HYPAM5-DS100 phase either (a) in isotropic condition at 65°c or (b) in a lamellar liquid crystalline state at 40°C with corresponding size distribution.

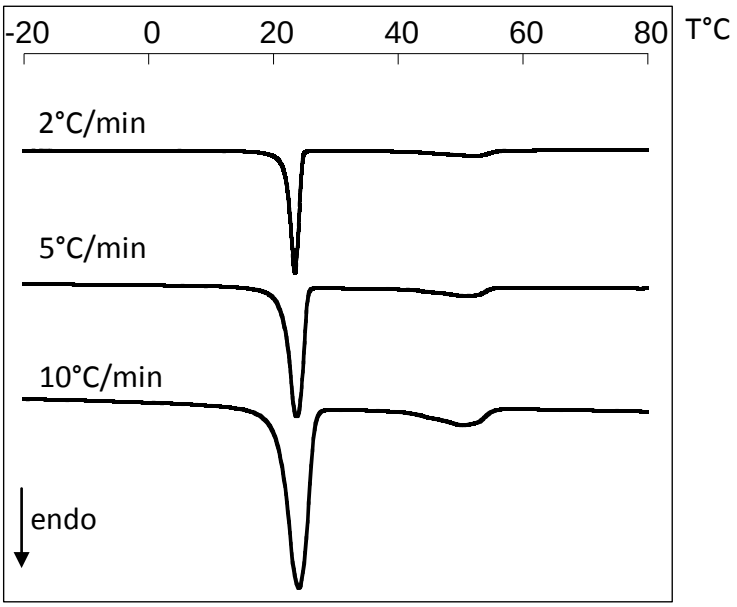

Figure S26. DSC thermogram recorded for HYPAM4-DS100 on heating at the rates of 10°C/min, 5°C/min and 2°C/min.

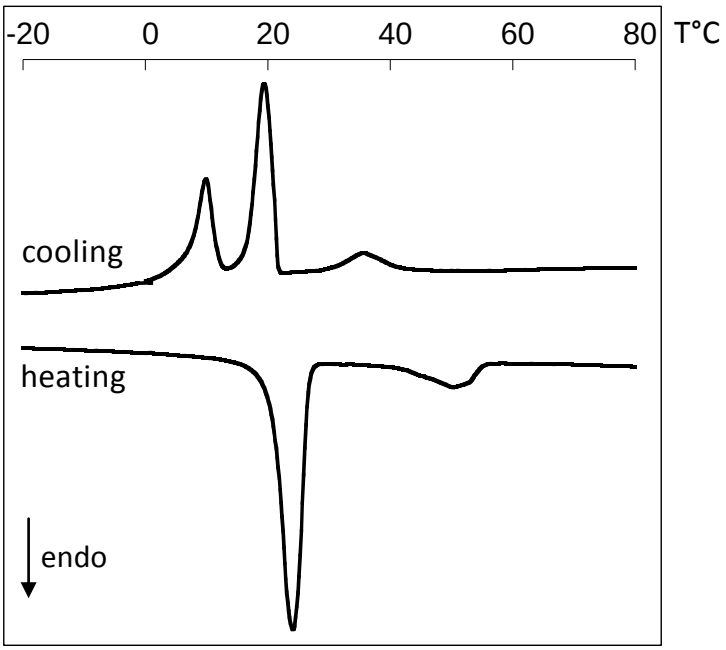

Figure S27. DSC thermogram recorded for HYPAM4-DS100 on both heating and cooling at the rate of 10°C/min

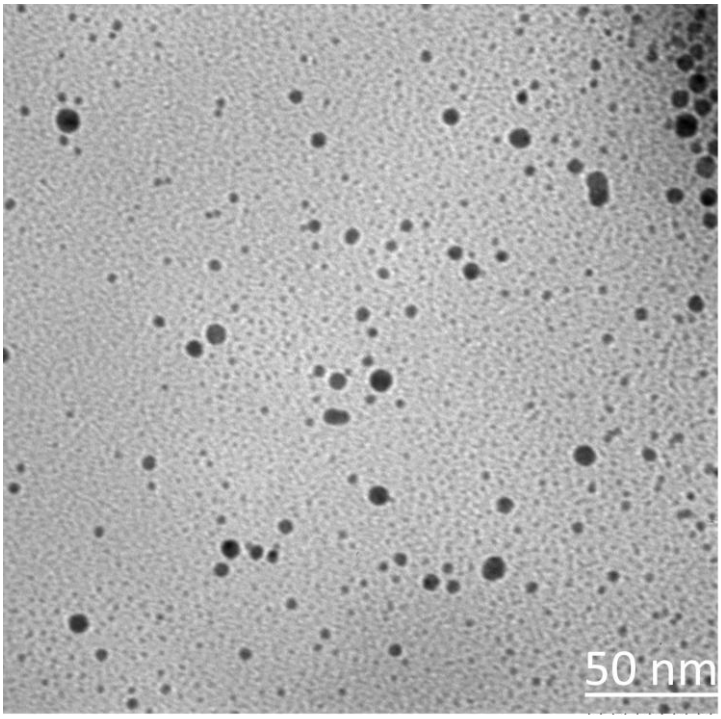

Figure S28. TEM micrographs of AuNPs synthesized in HYPAM5-DS100 at 65°C without using reducing agent H_2