

Electronic Supporting Information

Transfer of Hydrophobic ZnO Nanocrystals to Water: an Investigation of the Transfer Mechanism and Luminescent Properties

Determination of the yield of transfer.

Depending on the surfactant and its concentration, a clear water solution, a turbid water solution or a precipitate was observed after complete evaporation of the organic solvent. When the turbidity was too strong to allow proper absorbance measurements, the aqueous phases were filtrated using 0.2 μm cellulose filters. The concentration of ZnO Nps in the aqueous phase was determined from absorbance measurements, using the same value for the extinction coefficient of ZnO Nps in water and in dichloromethane. The validity of this hypothesis was verified as followed. First, the absorbance spectrum of ZnO NPs in water was measured using a sample transferred to water using Oleyl-10. This sample was then freeze-dried and dissolved in the same volume of dichloromethane. Comparison of the two absorbance spectra (Figure S1) demonstrated that the extinction coefficients are identical within the experimental error.

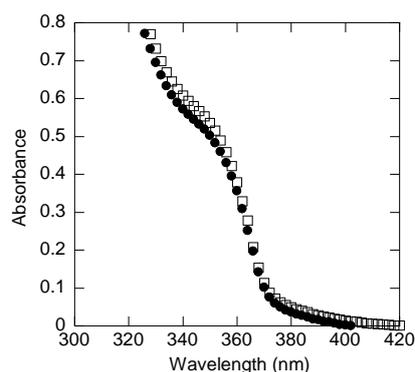


Figure S 1 : absorbance spectra of the ZnO Nps in water (●) and after dispersion in dichloromethane (□).

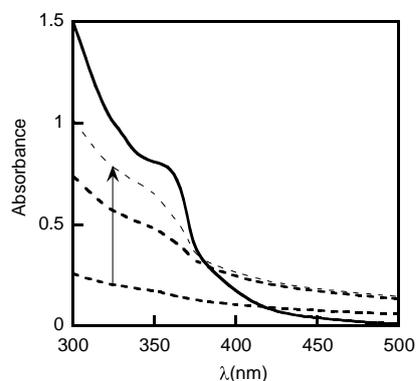


Figure S 2 : (---) Absorbance spectra of the aqueous solutions of ZnO/OA nanorods after transfer using Oleyl-10 at increasing concentrations (as indicated by the direction of arrow: 1mM, 2mM, 5mM). Full line: absorbance spectra of the starting nanorods in the same volume of dichloromethane.

Colloidal stability.

After transfer of the ZnO Nps to the aqueous phase using 1mM of Oleyl-10, the solution was stored in the fridge. No significant change in the absorbance of the solutions could be observed during the first three weeks, after which the Nps started dissolving.

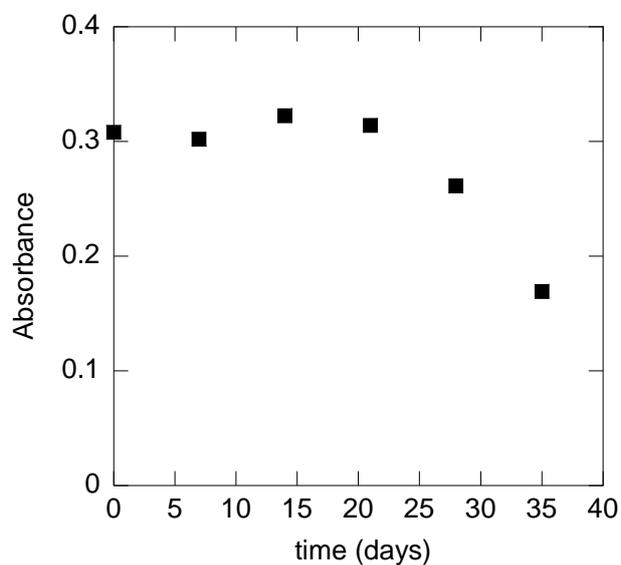


Figure S 3 : Evolution in time of the absorbance due to ZnO Nps during storage after transfer to water. Absorbance is measured at 350nm and corrected for light scattering by subtracting absorbance at 476 nm.

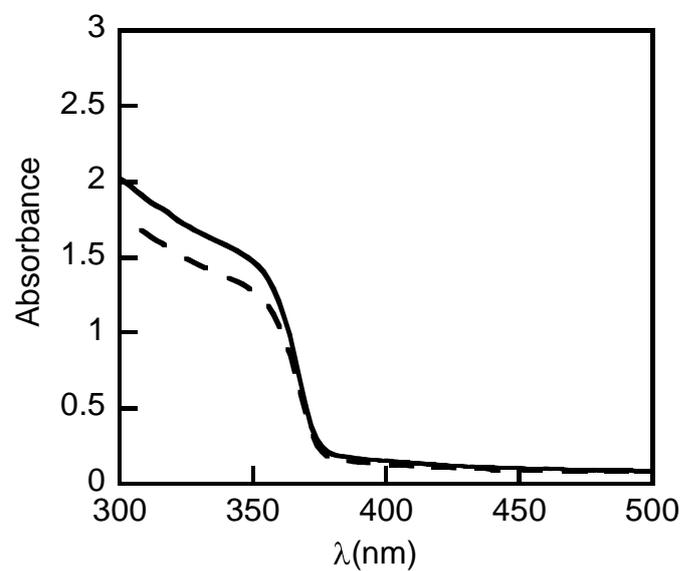


Figure S 4 : Absorbance of the ZnO/OA/Oleyl-10 in water (full line) and 48 h after addition of NaCl (1.75mol.L⁻¹; dotted line).

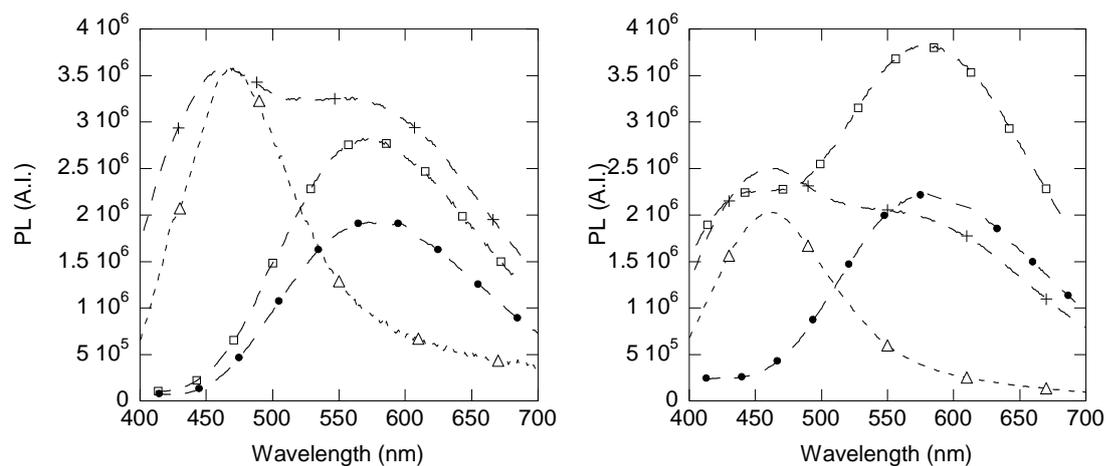


Figure S 5: Emission spectra of ZnO Ncs in dichloromethane (left) and in water (right). Excitation wavelengths (nm) (●) 300, (□) 350, (+) 365, (Δ)375.

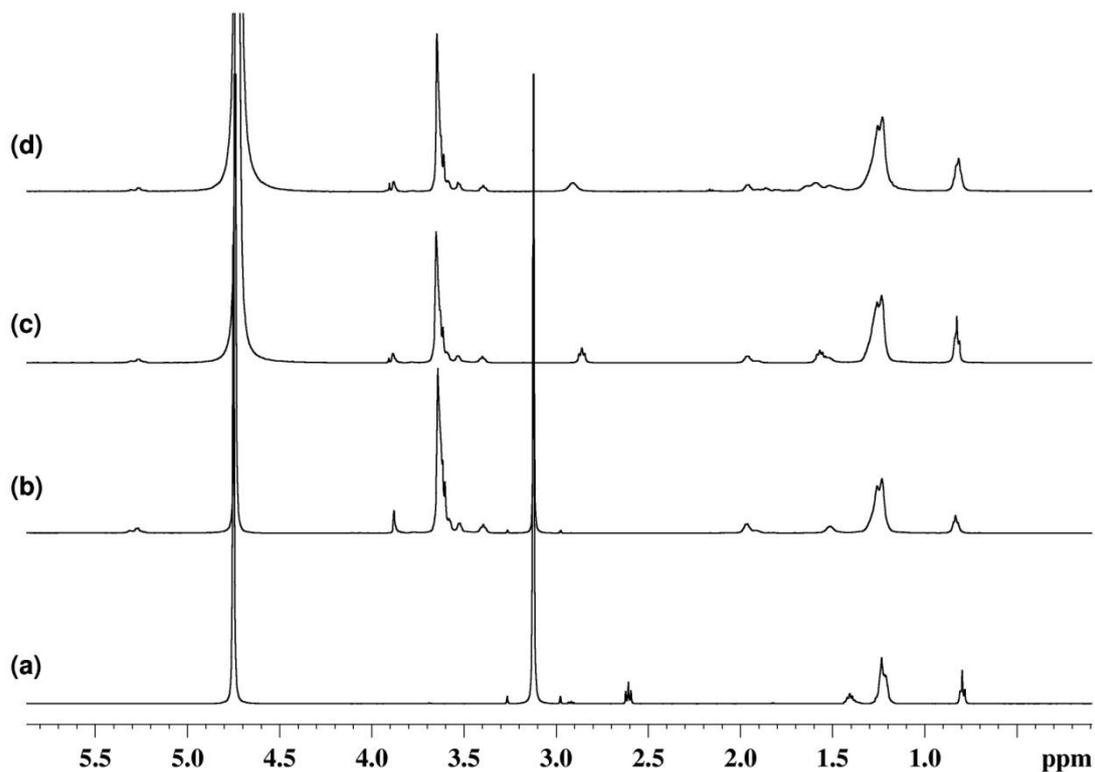


Figure S 6: ^1H NMR spectra in D_2O at 293K of OA at 8 mM (a) Oleyl-10 at 2 mM (b) a mixture of OA (8mM) and Oleyl-10 (2mM) (c) and ZnO/OA Nps with 2 mM of Oleyl-10.

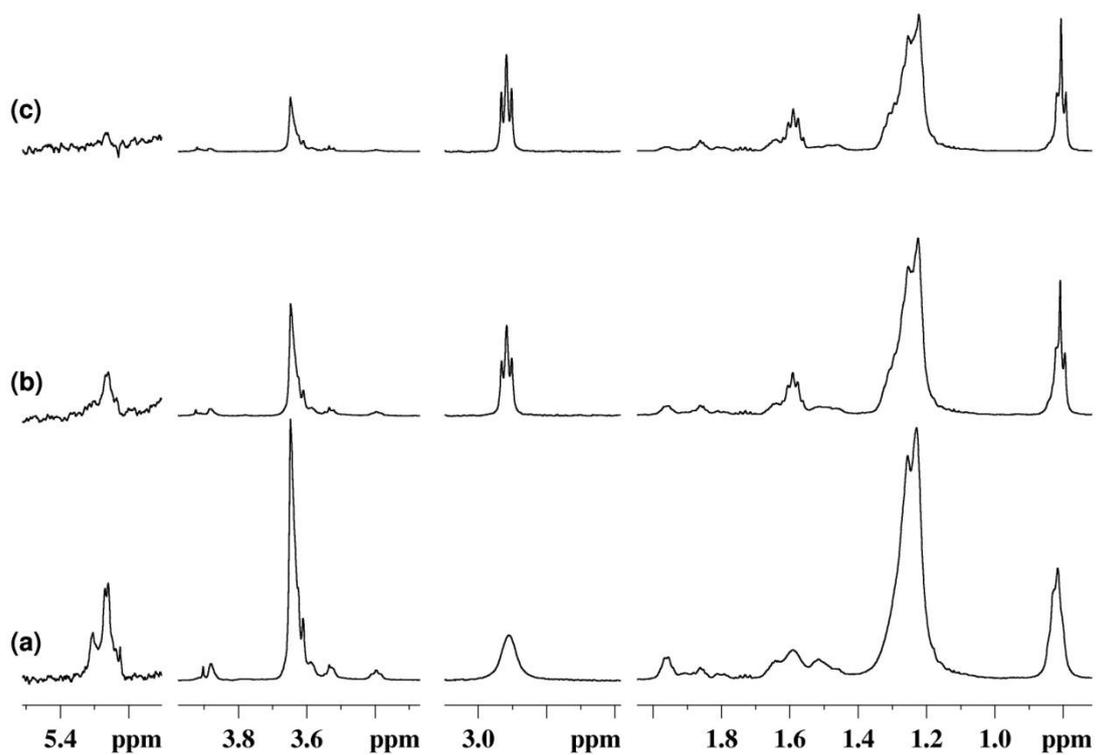


Figure S 7: ^1H NMR spectra in D_2O at 293K of ZnO/OA Nps with 2 mM of Oleyl-10 (a), with 1 mM of Oleyl-10 (b) and with 0.5 mM of Oleyl-10 (c). Only selected areas are shown for clarity. From left to right, resonances of alkene of Oleyl-10, of ethylene oxide groups of Oleyl-10, of methylene in α position of the amine head group of OA ($\alpha\text{-CH}_2$) and of other methylenes of OA and Oleyl-10.

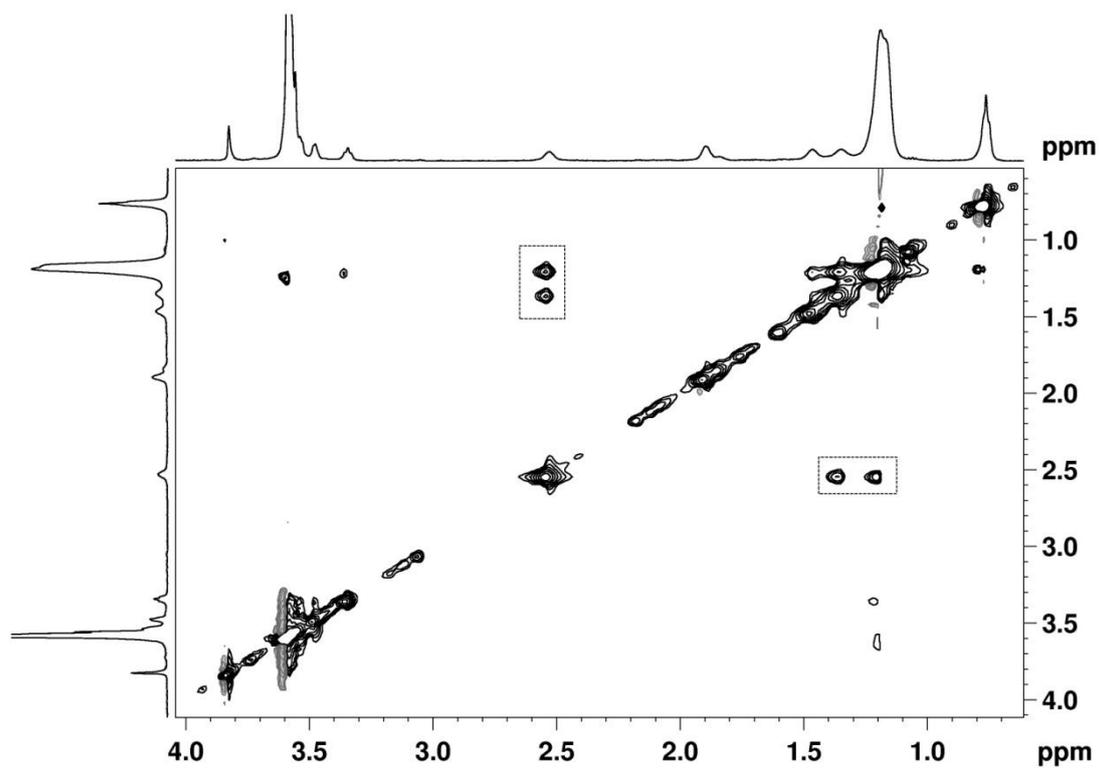


Figure S 8: NOESY spectra (mixing time 100ms) in D₂O at 293K of ZnO/OA Nps with 2 mM of Oleyl-10 at pH 12. Boxes highlight negative NOE cross peaks between the α -CH₂ and other methylene protons of OA.