General protocol for seed-mediated synthesis of gold nanospheres

The "seed mediated" method occurring in two steps: the first one involves the preparation of clusters called "seeds" (<3.5 nm) as previously reported approach.[1] It consists in reducing Au salt (5 mL of $HAuCl_4 \cdot 3H_2O$, 5×10^{-4} M) with a strong reducing agent (0.6 mL of $NaBH_4$, 0.01 M), at room temperature, in the presence of an appropriate coordinating agent (5 mL of cetyltrimethylammonium bromide (CTAB), 0.2 M). Such a solution of "seeds" was kept under stirring for 2 h and then used to grow Au NPs. For this purpose, $HAuCl_4 \cdot 3H_2O$ (0.024 M) was dissolved in 3 mL of cetyltrimethylammonium chloride (CTAC) solution (0.08 M), and then reduced by ascorbic acid (ascorbic acid/Au^{3+} = 2). As the solution became colourless, a suitable amount of seed solution was added. Then, the solution turned from white to bright red, thus suggesting the formation of spherical particles (8×10^{-8} M). The sample were purified by the excess of free surfactant by centrifugation at 8000 rpm for 20 min at T = 25 °C. The as prepared sample was characterized from a spectroscopic and morphological point of view. The CTAC-capped GNPs have been extracted in the $CHCl_3$ with decanoic acid by slightly modifying the Jana's protocol.[2] 100 mg of solid decanoic acid were added to 1 mL of the NP solution and sonicated for 5÷10 min, then 1 mL of neat chloroform were added to such GNPs solution. Finally, 1 mL of carbonate buffer (pH=9,6) has been added and the mixture was shaken. All the GNPs have been successfully extracted transferred in chloroform.

Thermal characterization of the nematic to isotropic transition of samples

We have performed a control experiment by measuring the transmittance (CW probe laser, emitting at $\lambda = 633nm$) of both pure NLC and NLC/GNPs samples (placed between crossed polarizers with the optical axis of the sample set at 45° with respect to the polarizer/analyzer axes) versus the external temperature. The temperature is controlled by a hot-stage; this is also

used to slowly cool down (0.2 °C/min) the samples to room temperature by means of a controlled ramp, once the isotropic phase transition has been reached.

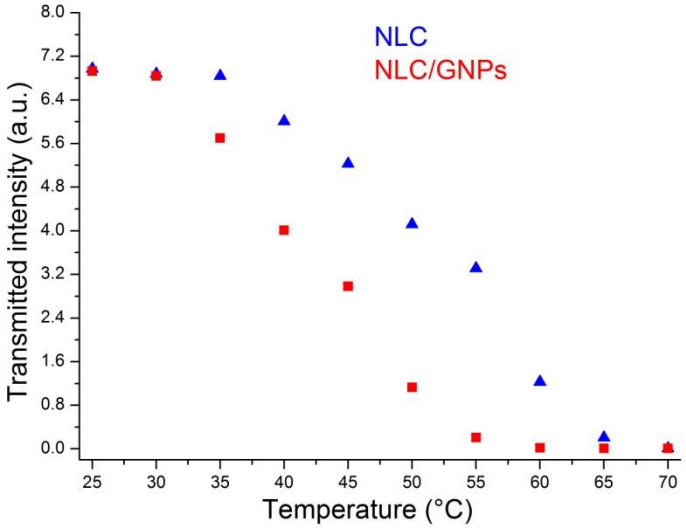

Figure S1: Transmitted intensity versus temperature for both NLC (blue triangle) and NLC/GNPs (red square) samples..

As a result, in both cases, the transmitted intensity exhibits a variation from a maximum to a minimum without any oscillating behavior. The pure NLC sample exhibits a nematic to isotropic transition temperature of about 65°C, while, in the mixed NLC/GNPs sample, the presence of GNPs acts as a destabilizer for the NLC component, lowering its transition temperature by about 10°C (55°C instead of 65°C).

References

[1] B. Nikoobakht, M. A. El-Sayed, *Chem. Mater.* **2003**, *15*, 1957.

[2] N. R. Jana, *Small* **2005**, 1, 875.