Spin crossover nanomaterials: towards sensor applications

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The phenomenon of spin crossover between high-spin (HS) and low-spin (LS) states of $3d^4$-$3d^7$ transition metal ions represents an important area of coordination chemistry. Beside its interesting fundamental aspects, the potential applications of this phenomenon draw much attention but can not be readily exploited in bulk materials. Therefore, we have developed various methods for fabricating spin crossover nanoparticles using polymers[1] or reverse micelles[2] as nanoreactors. We will show their size-dependent spin crossover properties, their patterning using soft lithographic techniques[3] and applications of these novel materials. In particular, we will discuss different strategies for signal transduction in chemical and physical sensors based on spin crossover complexes (see figure for an example of fluorescent transduction).[4]

References

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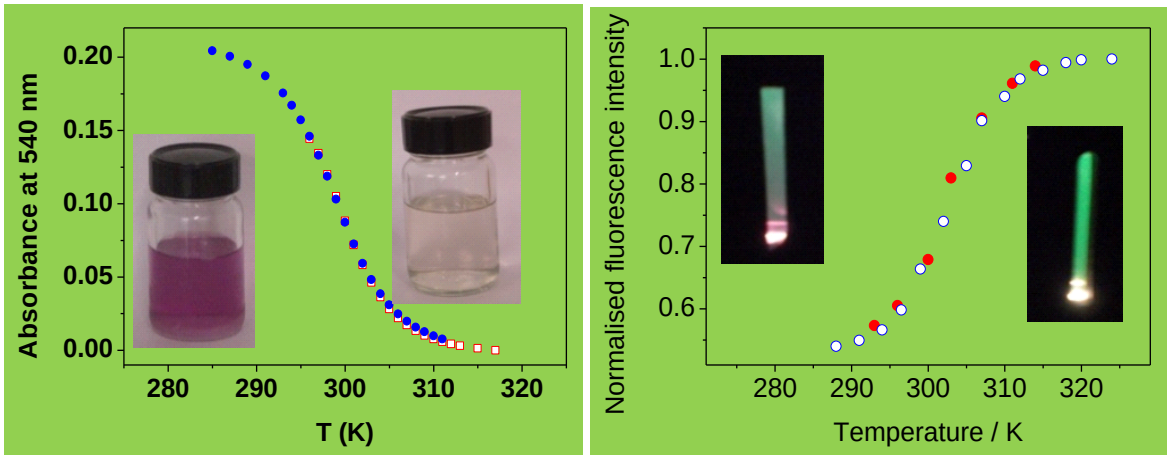
Figures



(Left panel) Temperature dependence of the optical absorbance (recorded at 540 nm) of the $Fe(NH_2Trz)_3(OTs)_2$ spin crossover nanoparticles (3 nm) suspension in the heating (open symbols) and cooling (closed symbols) modes. The inserts show the photographs of the sample at 295 K (violet) and 320 K (transparent). (Right panel) Temperature dependence of the fluorescence intensity (recorded at 540 nm) of the nanoparticle system doped by Rhodamine-110. The inserts show the luminescence of the sample (at 0.001% doping level) under white light excitation at 295 K and 320 K.