CAN LIQUID CRYSTALLINITY OVERLAP THERMAL SPIN CROSSOVER?

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Metallomesogens are of broader interest because the metal ion introduces into the liquid crystalline state some own properties as can be colour, absorption within the optical range, luminescence, paramagnetism, ferromagnetic or antiferromagnetic coupling, electrical conductivity etc. In oriented liquid crystals those properties can become macroscopically anisotropic, giving rise for some interesting applications. Thermal spin crossover is a specific property of some transition metal ions were the energetically favoured spin pairing at low temperature –low spin case –can reach unpairing at higher temperature-high spin case. Usually by heating and cooling a hysteresis take place. Well known examples for thermal spin crossover are Fe(III) or Fe(II) ions. Fe(III) is a d^5 spin system with the magnetism of one unpaired electron in low spin state but five unpaired electrons in high spin state. The transition is accompanied with some colour change. Fe(II) is a d^6 electron system-the low spin state is diamagnetic, $S = 0$, but the high spin state is paramagnetic, $S = 2$ with a change from colour to colourless. Usually spin crossover is a property of the solid state, accompanied with slightly changing in geometry.

Within the talk the question will be ventilated if spin crossover is possible in the liquid crystalline state. One example for Fe(III) was already reported, but here the smectic A phase exist above the crossover region (1).
In the second part of the talk some examples on Fe(III) and Fe(II) compounds will be presented were spin crossover and liquid crystallinity was observed.

References:

[1] Y. Galyametdinov, V. Ksenofontov, A. Prosvirin, I. Ovchinnikov, G. Ivanova, P. Gütlich, W. Haase: *Angew. Chemie Int. Edit.* **2001**, *22***,** 4269.