

# **Proflavin binding to LSMO nanoparticles at** temperatures above and below the Curie point



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### Idea:

- to investigate the binding ability of lanthanum strontium manganese oxide nanoparticles to proflavine at temperatures below and above the Curie point
- to calculate the binding parameters of Pf interaction with LSMO NPs
- to evaluate the influence of the changes in the magnetic properties of LSMO NPs on their loading with the Pf

- diameter is 10 nm, Curie point is 42°C
- trisodium citrate (NaCit)

- Zetasizer Nano ZS Malvern

### The experiments:

Spectrophotometric titration experiments were performed for LSMO-Pf and LSMO-NaCit-Pf systems at temperatures below (25°C) and above (60°C) the Curie point.



$$\frac{C_{bind}}{C_{PF}} = \frac{\sum_{i=1}^{n} i \cdot k^{i} \cdot w^{i-1} \cdot (C_{PF} - C_{bind})^{i}}{1 + \sum_{i=1}^{n} k^{i} \cdot w^{i-1} \cdot (C_{PF} - C_{bind})^{i}} \cdot \frac{C_{LSMO}}{C_{PF}}$$

The part of bound Pf increases if the loading takes place at temperatures above the Curie point. It is caused by partial destruction of NPs aggregates in LSMO suspension NPs losing upon their superparamagnetic properties.

T, °C	k, mol <sup>-1</sup>	n
25	2×10 <sup>4</sup>	110
60	2×10 <sup>4</sup>	150

The titration experiments were performed at fixed Pf and NaCit concentration and varied LSMO NPs concentration. The addition of modified LSMO NPs causes a decrease in the intensity of the Pf absorption spectrum.

The heating above the Curie point does not change the binding constant of Pf to LSMO NPs but increases the degree of Pf loading.

### Summary:

- Loading Pf onto LSMO NPs requires preliminary modification of nanoparticles surface to give it a negative charge.
- At temperatures above the Curie point, the loading of Pf on the surface of nanoparticles is more efficient.

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