

Magnetic ordering of iron ions in two kinds of Fe-chitosan complexes

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We report on the results of magnetic measurements for two different Fe-chitosan complexes with different structure and Fe-content: iron-crosslinked chitosan (Ch-Fe-CL) and iron-N-carboxymethyl chitosan (N-CM-Ch-Fe), with Fe-content 118 mg/g and 7 mg/g, respectively. The detailed analysis of the magnetic behaviour of Ch-Fe-CL have already been presented in [1] and demonstrates that iron ions in this material do not form superparamagnetic clusters, but exhibits features of a glassy state. New data obtained from the Mössbauer spectrometry reveal ferric ions in a high-spin state and in two different sites. Moreover these data confirm a noncollinear magnetic structure in Ch-Fe-CL and suggest the sperimagnetic ordering of Fe³⁺ magnetic moments. The static magnetic and Mössbauer measurements of N-CM-Ch-Fe show an inhomogeneous magnetic structure: a part of Fe-ions are antiferromagnetically coupled and the rest remain in a paramagnetic state. The iron ions in N-CM-Ch-Fe are in two states – Fe³⁺ and Fe²⁺. A mixed paramagnetic-antiferromagnetic behaviour of N-CM-Ch-Fe indicate that some of Fe ions are not distributed randomly within the polymer but rather forms Fe-chains.

[1] N. Nedelko *et al.*, *phys. stat. sol. (c)*, **3**, 126 (2006)

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