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Novel manganese complexes based on a pyclen derivative: synthesis and relaxometric characterization

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In medicine, medical imaging has a leading place in the diagnosis setting. This is why some researches are continually carried out to improve the available techniques. One of the most used techniques to obtain anatomical information is magnetic resonance imaging (MRI). The commercially available contrast agents are based on gadolinium complexes. Recently, it has been shown that gadolinium can lead, mainly for patients with renal disfunctions, to a pathology named NSF (nephrogenic systemic fibrosis). It is thus interesting to develop efficient contrast agents based on another paramagnetic ion such as manganese. The macrocycle used in this work is a pyclen derivative which is functionalized to respect protection and deprotection steps. Their efficacy as contrast agents for MRI was evaluated by relaxometry and ¹⁷O NMR and even if the results are encouraging, the manganese ion is, as expected, less effective than the gadolinium ion. So, it could be interesting to encapsulate the Mn-complexes in nanostructure like polymersomes which allow a fast exchange of the water molecules through the pores. The complexes could thus be encapsulated inside the polymersomes or in the membrane in order to improve the relaxivity through an increase of the rotational correlation time.