# SYNTHESIS OF GADOLINIUM OXIDE NANOPARTICLES AS A CONTRAST AGENT IN MRI

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Contrast agents are used on a common basis in clinical MRI since they can influence the MR signal by locally affecting relaxation parameters in the tissues (T1 and T2). Small-molecule contrast agents made of chelated paramagnetic gadolinium ions are known to affect T1 and can diffuse to the extracellular space . Those agents are quickly eliminated through the urinary tract. On the other hand, intravenously injected superparamagnetic iron oxide nanoparticles can stay in the blood for longer times, and are therefore used as blood pool contrast agents. Iron oxide nanoparticles are generally more effective for T2 enhancement. This work reports on the synthesis, preparation and functionalization of gadolinium oxide nanoparticles developed as contrast agent in MRI. Appropriately capped and prepared in aqueous suspensions, $Gd_2O_3$ nanoparticles could serve as an interesting T1 blood-pool imaging agent, complementary to existing T2-enhancing nanoparticle-based contrast agents. As a complement to MRI, gadolinia nanoparticles could also be used for neutron capture therapy in oncology, since gadolinium has the highest thermal neutron absorption cross section of all elements. In our studies, we synthesized through a chemical way $Gd_2O_3$ nanoparticles similar in size to commercial superparamagnetic iron oxide nanoparticles. The particles are capped in order to prevent leakage of the toxic $Gd^{3+}$ ions from the crystal core. The compound is then dialyzed either in water or in aqueous buffers at stable pH in order to reproduce physiological conditions. Magnetic resonance relaxation parameters T1 and T2 will be presented and discussed for different products, and correlated to the particle size distribution, type of capping and type of buffer used during the preparation of the agent