PhD Thesis Evaluation Form

Candidate: Alberto Fringuello Mingo

Title of the PhD Thesis: Present and novel paramagnetic agents for Magnetic Resonance Imaging: a deep diving into the behaviour and the mechanisms of relaxivity

1. Originality of the Research
*unacceptable / sufficient / satisfactory / good / very good / **excellent***

Please, motivate the original aspect of the thesis and assess the clarity of the problem definition (max 100 words).

The main objective of the thesis is a detailed characterization of presently used contrast agents for magnetic resonance imaging and the development of new molecules with improved performances. The excellent originality of the research is due to two factors: the development of new potential Gd^{3+}-based contrast agents, cleverly designed on the basis of an extensive characterization of the NMRD profiles, and the characterization of the relaxation properties of known and novel Mn^{2+}-based contrast agent, which can avoid the toxicity problems of gadolinium compounds. The complexes designed in these studies represent important improvements for future medical applications.

2. Scientific Quality of the Research
*unacceptable / sufficient / satisfactory / good / very good / **excellent***

Please, provide an evaluation of the scientific quality of the research with respect to how it was designed, executed and to the achieved results, also in terms of publications and manuscripts that may be publishable in peer reviewed journals (max 100 words).

The research contents of the thesis are of very high quality as proved by the two articles published in peer reviewed journals and by the four patents. The design of the new complexes proposed as contrast agents is conceived from an accurate characterization of the factors governing the paramagnetic relaxivity of Gd and Mn compounds in the human plasma. The experiments were carefully planned and performed. MRI experiments were also performed in vivo (in mice) in order to compare the quality of the images obtained using Mn-containing nanomaterials and commercial Gd-based contrast agents.

3. Candidate's Reflection on the Research
*unacceptable / sufficient / satisfactory / good / very good / **excellent***

Please comment on the scientific competence, the depth and breadth of knowledge, and the research skills of the candidate (max 100 words).

It is clear that the candidate has an excellent knowledge of the investigated area and demonstrates in-depth understanding of the factors to be considered for the development of MRI contrast agents. He has performed a variety of experiments (^{1}H NMRD, ^{17}O NMR, in vivo MRI) in different conditions, and was able to describe all of them and discuss them with respect to one another. The conclusions are well written and summarize the different research projects in excellent way.

4. Quality of Written Presentation
*unacceptable / sufficient / satisfactory / good / very good / **excellent***

Please, provide a short evaluation of the thesis as a whole: are hypotheses or research questions clearly formulated, are they well framed in a broader scientific context, are results and conclusions presented clearly, are different chapters well integrated? (max 100 words)

The thesis is well organized and it is written in very clear and easily readable language. The topics to be covered are introduced very well, with an excellent background. The objectives and research questions are clearly formulated and framed in a broader context. All experimental results are clearly described in sufficient details to allow the reader to carefully understand how the data have been analysed. The results are nicely discussed and summarized in the conclusions sections. All chapters of the thesis are well integrated.

5. Overall Assessment
*unacceptable / sufficient / satisfactory / good / very good / **excellent***

The undersigned considers that the PhD candidate can defend the thesis: **yes**

Name of the Evaluator: Giacomo Parigi

Date: 27 January 2017

Signature: