Opto-magnetic nanoparticles with upconverting properties for optical imaging and photothermal therapies

Bozena Sikora-Dobrowolska¹, Anna Borodziuk¹, Magdalena Kulpa-Greszta², Robert Pazik², Tomasz Wojciechowski¹, Kamil Sobczak³, Jaroslaw Rybusinski⁴, Jacek Szczytko⁴, Lukasz Klopotowski¹

¹ Institute of Physics, Polish Academy of Sciences, Al. Lotników 32/46, 02-668 Warsaw, Poland ²Institute of Biotechnology, College of Natural Sciences, University of Rzeszow, PL-35310 Rzeszow, Poland ³Faculty of Chemistry, Biological and Chemical Research Centre, University of Warsaw, PL-02089 Warsaw, Poland

⁴Institute of Experimental Physics, Faculty of Physics, University of Warsaw, PL-02093 Warsaw, Poland



3. The temperature effect was measured using 808 nm and 880 nm lasers as a function of laser power. A significant increase in temperature was observed with increasing laser power for both wavelengths for aqueous solutions of NPs at a concentration of 2.5 mg/ml. The SAR parameter increased with the power of the laser for both laser wavelengths. The highest value was obtained for an 880 nm laser with 1600 mW (87 W/g).

4. As we showed earlier, phototherapy on Fe_3O_4 materials is more effective in the context of heat induction compared with others. In combination with up-converting properties, we obtained a multifunctional nanoconstruct suitable for imaging (cancer detection) and therapy through phototherapy in the optical biological windows.