Garnet-Based Ratiometric Nanothermometers for High Spatial Resolution Applications with Supreme Performance

In the course of the research we shall discern a group of garnet-based Pr^{3+}-activated luminescence NANO-thermometers - sensitive, accurate and working over exceedingly wide and controlled range of temperatures (10-900 K)

Non-contact thermometry is of growing interest for novel and emerging technologies. It surpasses the contact solutions especially when it comes to nanotechnology and when high-resolution is of interest. For this project we selected a group of materials activated with Pr^{3+}. We find this ion especially attractive for luminescence thermometry due to its specific luminescent properties. We shall apply sophisticated chemical techniques of altering and modeling properties of luminescent materials to get NANO-thermometers offering high resolution and sensitivity combined with unachievable till now range of measurements.

Successful realization of this project will bring a great advancement in this field and practical applications will be on horizon. The key aim is to make and thoroughly characterize NANO-thermometers which will surpass what is presently reported in literature. Our materials might be of special interest for bio- medical- and nano-electronic as well as space applications in future.

We anticipate that the project will revive this field of research and will have a substantial and immediate impact on the whole discipline in the next years all over the World. We are confident that we are opening a new chapter in research on luminescent NANO-thermometers and NANO-thermometry. NANO-garnets will open new era in this innovative novel topic. We offer a truly novel approach to NANO-thermometry. All that, because we found a way to effectively manage the radiative and non-radiative processes of Pr^{3+} emitting center in various materials.