

The main objective of the research proposed in the project is the effect of generation of broadband laser induced white emission (LIWE) in visible and near infrared regions and photoconductivity accompanying this process from the compounds characterized by perovskite structure. The compounds are selected so as to investigate the impact of lanthanide ions and also the influence of band gap size on generation of LIWE and photoconductivity in high power excitation conditions.

In order to synthesis the nanocrystals in function of average grain size the wet chemistry methods will be used. Obtained samples will be a subject for detailed structural, morphological and spectroscopic characterization. The phase purity will be determined from X-ray diffraction measurements. Structural characterization will be enriched with images of scanning and transmission electron microscopes. The energy levels will be determined from absorption spectroscopy measurement in reflectance setup. Optical as well as photoconductivity measurements of investigated nanocrystals will be performed in high power excitation conditions in vacuum atmosphere. The average grain size of the nanomaterial along with the charge state of its surface defining locally dense spectrum of states are the key elements in this research. Nanocrystals, in contrast to their microscopic analogues, are characterized by a high surface to volume ratio, which strongly affects the change in the intensity of already known or appearance of completely new spectroscopic effects. Papers associated with LIWE phenomenon can be found in the literature. Most of them show that the generation of broadband anti-Stokes white emission in visible range is closely related to the size of crystallites. This type of luminescence has been observed so far in nanometric materials. To the best of our knowledge there is no report in the literature considering the mechanism of laser induced emission observed in NIR range.

Currently, many publications in the literature can be found where the possibility of white light generation due to the mixing of different colors (RGB - red, green, blue or yellow, blue) are reported. The spectrum of light obtained in this way, which is far from the spectrum of sunlight, negatively affects human beings. In order to reduce this effect, there was a need to obtain a broadband source of white light which will be free from the disadvantages of previous technologies.