

Materials with perovskite structure have the potential to revolutionize modern electronics. Used in the third generation solar cells already at the initial stage of research, doubled their efficiency. They may also be used in a new class of displays and light bulb based on LED technology, and used to construct the laser of any color including blue. In contrast to technologies existing on the market devices based on perovskite nanocrystals can be prepared by low temperature processes and in thin film technology, and therefore do not require large energy input and consume a minimum amount of material. This allows them to significantly reduce production costs and thereby increase their accessibility to a consumer. To put it more illustrative, these devices may be printed in a similar way as our home inkjet printers do. This gives the ability to quickly cover large areas, and the use of flexible substrates. As a result, solar panels and displays printed on foil, will be lightweight and easy to transport. If necessary, you can expand them, and when you will no longer use your device, simply roll it in your pocket. Moreover, thanks to its unique feature, perovskite nanocrystals can also be used as novel markers in imaging of biological tissues giving chances for early diagnosis and treatment of cancer.

The aim of the project is the synthesis and study of the optical properties of perovskite nanocrystals underlying their use in the above applications. Nanocrystals will be exposed to invisible to the naked eye laser light from the infrared range of ultrashort pulses lasting only 0.1 trillionth of a second, and the intensity of the order of GW/cm^2 . Processes will be studied in which the laser energy is absorbed and converted by the perovskite nanocrystals into light from the visible range.