Description for the general public

Research area of the project is in the field one of the rapidly developing branch of science which is photonic materials engineering and concerns development of new fluoroindate glasses doped and co-doped with rare earth ions and fabrication of optical fibers for application in broadband amplified spontaneous emission sources of radiation operating in the field in the 1800-6000 nm spectral range. Wavelength range above 1.5 μm (eye-safe region) is especially interesting because of potential applications in both military and civilian applications such as telemetry, optical laser lidar systems, microsurgery, medical diagnostics and environmental monitoring. Development of new glasses, with new properties requires a multidisciplinary approach combining materials engineering and photonics. One of the main tasks of the research is to determine the effect of the concentration of activators (lanthanides: Er^{3+}; Pr^{3+}; Dy^{3+}; Yb^{3+}/Er^{3+}; Tm^{3+}/Ho^{3+}; Yb^{3+}/Ho^{3+}; Dy^{3+}/Tm^{3+}; Tm^{3+}/Pr^{3+},Tb^{3+}) in the glasses on the mechanisms of the energy transfer between rare earth ions and the shaping of the luminescence spectra. Authors hypothesised that the selection of a suitable chemical composition of glass and active dopant concentration give possibility to obtain broadband luminescence in glasses and optical fibers in the near and mid-infrared spectral range. An important from the application point of view is the fact that thermal parameters of the elaborated fluoroindate glasses, as well as strict drawing parameters will enable to form glass fibers. This is an key stage in the development of the construction of the optical fiber characterized byamplified spontaneous emission (ASE) in the mid-infrared spectral range, which allows to develop of new compact sources of optical radiation sources. Proposed topics are innovative in the field of materials science, optoelectronics and photonics. The contribution to the development of science is a set of basic research on the analysis of luminescence properties of fluorindateoptical fibers, which will allow to shape of luminescence spectra and construction of new sources of radiation operating in the MID - IR.