In recent years there is a great interest in ceramic materials exhibiting enhanced emission in wide spectral range (from visible to infrared). The proposed project deals with low-phonon ceramic phosphors with the orthorhombic olivine-type structure.

The objectives of the project are: preparation of ceramic materials Li_2MGeO_4 and $Li_2MGeO_4:Ln^{3+}$ (M = Zn or Mg; Ln - rare earth ion), influence of chemical composition and technological parameters on formation of orthorhombic olivine-type (undoped and Ln^{3+}-doped) germanate ceramic materials, thermal and structural characterization of germanate ceramics using different experimental techniques: DSC, XRD, TEM, SEM, IR and Raman methods, emission investigations of $Li_2MGeO_4:Ln^{3+}$ ceramics under different excitation wavelengths, examination of radiative and non-radiative relaxation processes and studies of germanate ceramic phosphors with olivine-type crystal structure in relation to practical applications as the optically-active media for near-infrared ceramic laser sources.

In particular, the radiative and non-radiative relaxation processes and their mechanisms between ceramic host lattice and/or the optically active ions (rare earth ions) in Li_2MGeO_4 (where M denotes Zn or Mg) will be examined in details. We postulate that the enhanced luminescence, especially near-infrared luminescence related to main laser transitions of Ln^{3+}, can be achieved through strong sensitization and efficient energy transfer process from the orthorhombic olivine-type Li_2MGeO_4 (M = Zn, Mg) host lattice to rare earth ions.

These aspects are interesting from the scientific point of view. They are also important for solid-state laser sources emitting near-infrared radiation. In our opinion, the project gives important contribution to development of scientific research in the field of ceramic science and technology, inorganic phosphors, solid-state laser materials and applied spectroscopy.