Pressure, alongside temperature, is one of the most crucial thermodynamic parameters. Its value not only influences the nature and rate of processes and reactions but also serves as an extremely valuable diagnostic signal in medicine, mechanics, and safety systems. Therefore, accurate pressure control is of paramount importance. Durable and non-toxic optical pressure sensors, particularly luminescent pressure gauges, significantly expand the range of potential applications due to their unique properties. By enabling remote, electrically passive readings and spatial imaging, this technique offers a wealth of additional information that is highly valuable from an application standpoint.

As part of this project, we aim to conduct research that will enable the future development of highly sensitive and precise luminescent manometers based on pressure induced changes of the luminescence kinetics. Utilizing luminescence for pressure measurement allows for both local measurement and two-dimensional imaging of pressure changes. The unique and innovative technique, which will be a developing of the authors' previous research (fundamental for the field) proposed in this project selection of luminescent ions with complementary properties and a novel readout approach will dramatically increase the sensitivity and scope of applications of luminescent manometers. This project will establish correlations between the chemical composition of the phosphor and its effect on the luminescence properties of the materials under compression.