

Thesis/diploma topic suggestions of the Institute of Physics for students majoring in Chemistry BSc/Chemical Engineering BSc/Chemistry MSc

Dr. István Csarnovics

Production and testing of metal nanoparticles for the development of sensors

One of the best methods for detecting molecules is Raman spectroscopy. However, the light-matter interaction is quite weak in this method, so it is necessary to amplify the Raman signals, one possibility for this is the use of metal nanoparticles. During the research, the student can get involved in domestic and international research, during which he/she can examine several different metal nanoparticles, as well as their surface-enhanced Raman scattering, as well as the properties of optical sensors.

Reduction of the detection limit of various analytes and molecules during tests with a Raman microscope.

One of the best methods for detecting molecules is Raman spectroscopy. However, the light-matter interaction is quite weak in this method, so it is necessary to amplify the Raman signals, one possibility for this is the use of metal nanoparticles. During the research, the student can get involved in domestic and international research, during which we would try to reduce the detection limits of various analytes and molecules with the help of surface-enhanced Raman scattering.

Examination of different cells by Raman spectroscopy.

One of the best methods for detecting molecules and cells is Raman spectroscopy. The combination of microscopy and spectroscopy provides a great opportunity, and in addition, the examination of the molecular structure of cells becomes possible. With this, different cells, the differences between them, and their changes can be examined. By combining it with metal nanoparticles, we get an efficient, sensitive device. During the research, the student can get involved in domestic and international research, during which we would examine different cells using Raman scattering microscopy.