DESCRIPTION FOR THE GENERAL PUBLIC (IN ENGLISH)

(State the objective of the project, describe the research to be carried out, and present reasons for choosing the research topic - max. 1 standard type-written page)

Semiconductor nanostructures are the basis of modern electronics, from transistors and silicon to semiconductor lasers and LEDs. The presence of strain in nanostructures has a significant impact on the application of such structures and devices. The most commonly used method to study the strain in the nanostructures is the transmission electron microscopy. It requires however a specific processing of the sample, thus destruction of the nanostructure. The method proposed in this project for determination of strain is not destructive and should allow for gaining new information regarding distributions of stress in semiconductor nanostructures that are important in the design of new nanostructures and devices. Effect of strain on the electronic structure of both nanostructure and the magnetic dopant has an important cognitive significance.

Within this project we propose to investigate the possible use of magnetic ions (transition metal) to study the local stresses in semiconductor nanostructures. The preliminary results obtained in the Department of Solid State Physics of the Faculty of Physics at the University of Warsaw show, that the Optically Detected Magnetic Resonance (ODMR) method applied for the manganese ions in single quantum well is sufficiently sensitive to study the strain in such a quantum well. On the other hand our experiments with the quantum dots with single magnetic ions of cobalt and iron showed that this ions are much more sensitive on strain that the manganese ion.

We plan to start the efforts to observe ODMR signal for quantum wells doped with cobalt ions. In case of success we should determine the dependence of observed splitting of cobalt ion ground state on strain.

The suitability of the method using transition metal ions for determination of strain will be checked by studies of the distribution of strains in various places in the quantum well (in the middle of the well and at each interface), either by using ODMR on cobalt ions or on manganese.