Assessment of habilitation thesis:
Laser-mediated manipulation of matter at the nanoscale
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The subject of this work is highly topical. It involves the creation of functional nanostructures using a laser beam. It is actually crystal engineering in nano dimensions, which leads to significant changes not only in the arrangement of atoms, but mainly to changes in the electronic structure. As a result of these changes, there are new properties and new possibilities of using these anomaterials. The work is divided into 3 thematic areas, according to the use of laser-modified nanostructures.

The first thematic area described in chapter 3 "Laser-modification of nanocomposites" deals with the laser modification of crystal structures in nanoscale and the effects of these modifications on the electronic structure and thus on the properties of nanocomposites, including a proposal for the practical use of these technology in photonics and biomedical applications;

The second thematic area – in chapter 4 describes the techology of nanoalloy formation and the junction of multiple elements, which means the fusion of two or more types of elements in a single system where at least one of its dimensions is confined to the nanoscale. Similar to the first chapter, the main aim of creating nanoalloys is the modification of electronic structures due to the addition of different element in the nanoalloy. The author presented several examples of the use of this technology to change physical (optical, electrical, magnetic) and chemical properties (in catalysis, degradation of pollutants…).

The last chapter is devoted to the control of morphology and size of nanoparticles and the importance of this control for practical applications.

The work is rich in original results and brings valuable new knowledge for the development of nanotechnology and new areas of use of nanomaterials. I appreciate the emphasis on the practical use of prepared materials. As for the formal side of the text, nothing can be faulted.

For the course of the defense, I propose a slightly more detailed description of the technology as far as possible, I understand that it is a sensitive matter when it comes to the protection of intellectual property. Another topic that seems interesting to me is the comparison of laser modifications with analogous technologies, such as the modification of nanomaterials with ion beams.

I recommend recognizing this work as a habilitation and after the successful defense the award of the title of associate professor.

Prof. RNDr. Pavla Čapková, DrSc