

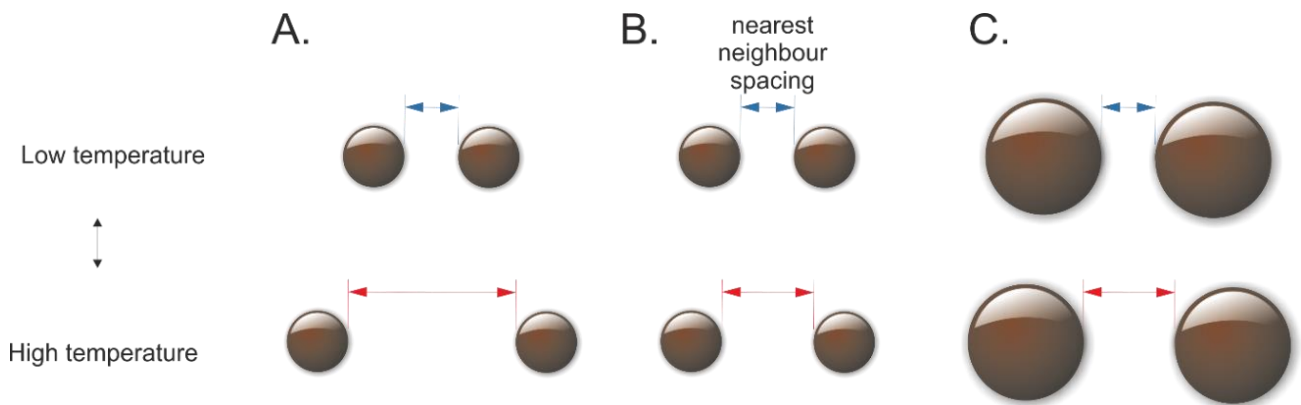
Generation, emission and control of the light are very important and the most developing issues in contemporary technology. The efforts of many engineers and scientists are undertaken to find new approaches of the use of energy and information carried by the light. It is worth mentioning two objectives that may result from these discoveries: ultra-fast computers with massive computing power and metamaterials that allow to create invisibility. Over the next few years, new technologies based on the use of the light have great potential to revolutionize many areas of our live, such as telecommunication or the storage and processing of data.

One of the necessary conditions to achieve these objectives is to obtain materials that will give us the ability of dynamic control over the light. High hopes are connected with hybrid materials (metallic nanoparticles coated with liquid crystal organic ligands) and their ability to dynamic self-organization.

Attempts to control dynamic arrangement rely on influencing the closest neighbourhood of nanoparticles, so far. We can distinguish two groups of such methods: influence on the matrix, wherein the nanoparticles are embedded and by influence on the surface of the nanoparticle's ligands. Particular interest attract material in which the matrix or ligands are liquid crystal materials.

This project offers an approach combining both the above-described methods of doping nanoparticles to liquid crystals and coating nanoparticles by LC ligands. We are going to use nanoparticles coated with liquid crystal ligands, which will then be mixed with low-molecular or quasi-polymeric liquid crystals (Fig.1A). This way we will provide compatibility between the liquid crystal matrix and nanoparticles, which will offer better control over the distances between the nanoparticles.

In addition, for larger nanoparticles this approach will allow us to maintain the ratio between the volume of the organic and the inorganic part on such a level which allow to obtain self-assembly and ENZ properties (Fig.1B).



**Figure 1.** Scheme showing changes of nearest neighbor interparticle spacing between metallic cores of Ag NPs in response to changing temperature of the system. Two possibilities for enhancing electrooptical response in comparison to the current state of the art (B) is shown in (A) and (C); (A) response enhanced by enlarging the change of interparticle spacing; (C) response enhanced by keeping the change of interparticle spacing but enlarging nanoparticle size; organic ligands are omitted for clarity.