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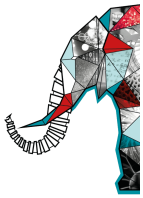

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Design of anisotropic xerogels for nonlinear optical applications

With the increase of the use of lasers over the years, optical power limiting materials have gained interest. These materials, allowing to lower the intensity of a transmitted light beam, find applications in camera or optical sensors protection, in fields such as aeronautics or transports. To design such hybrid materials, a silica-based matrix can be synthesized and doped with high concentration of nonlinear organic chromophores. This matrix then forms a solid bulk material with strong absorbing properties with ultrafast activation, high damage threshold and high photoptic transmission. The co-addition of gold nanoparticles into the hybrid system allows an enhancement of the optical responses of the chromophores, through the controlled interactions between the molecules and the metallic nanoparticles. Thus, gold nanoparticles have been successfully coupled to chromophores to strongly enhance their nonlinear characteristics.

However, the shape of the gold nanoparticles can cause anisotropic properties, that could modify the interactions between particles and chromophores, depending on their relative orientations. In this work, we are developing a host matrix to allow us to control the orientation of gold nanoparticles and chromophores, to study the interactions of the organic molecules and nanoparticles, as well as their impact on the optical properties. We thus expect to have access to the relationship between the structure of these materials and their optical properties.

Choix de session parallèle

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