

Popular science abstract

Microscopic imaging of the light amplification phenomenon

Imaging is one of the main techniques necessary for the development of the many fields of science. Microscope imaging is crucial in biology, materials science as well as in physics. This phenomenon is commonly used in industry or medicine. Despite this being a highly developed branch of science it still has lots of space for research and development.

The main task of the project is to develop, characterize and improve a new microscopic imaging technique based on the phenomenon of light amplification. There are some mentions of this technique and first attempt to study, however it was presented with limited possibility and unsatisfactory resolution which will be improved by studies in the project.

Light amplification is a phenomenon necessary to observe a laser light emission, so it is a phenomenon that accompanies us in everyday life, even if we are not aware of this. The development technique will make it possible not only to show the image of the sample and the places emitting light, which have been presented so far in this type of research. It will also allow a simultaneous analysis and characterisation of the specific place of the sample, as well as determining its contribution in emission overall. So far, information has been collected as an image with additional information about emission from a general area, not the specific structure.

The project combines material research to characterize fluorescent dyes and the production of microstructures, the study of light emission and its use as a tool for imaging and characterization of material. The research has an interdisciplinary character which will affect further development and understanding issues raised in it. Laser action spectroscopy increases the resolution of image and adds information about the structures and properties of material, about the coupling of the resonators and resonators themselves. This is a very promising technique that will bring a lot to our understanding of the light amplification phenomenon.

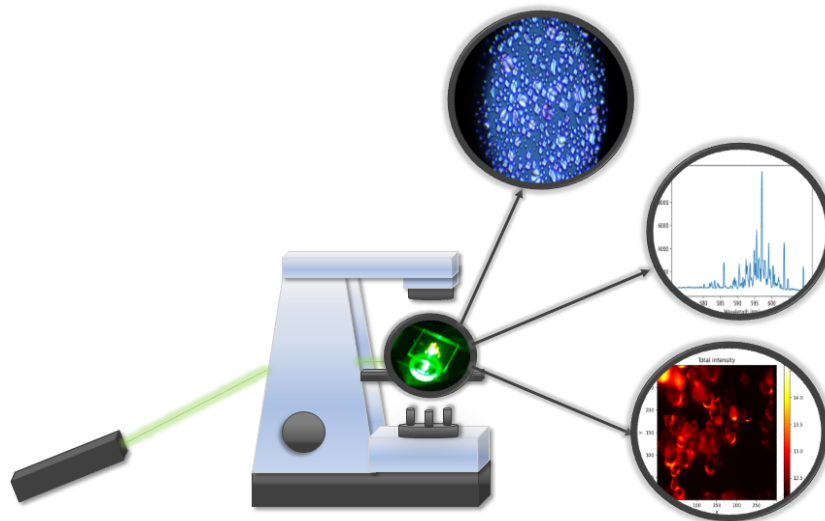


Figure 1. Graphical abstract of the issue studied in the project: imaging, emission studies and microstructure mapping.