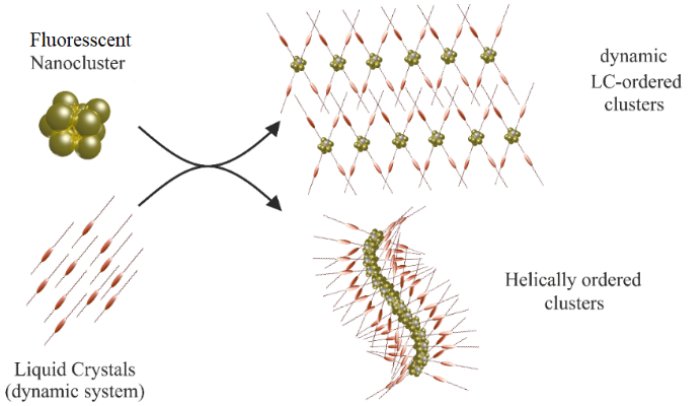
Adam Mickiewicz, the Polish national poet, in his poem "Romantyczność", writing: "Feeling and believing talks to me more than a wise man`s loupe and eye". By this statement he clearly declared himself a romantic. In this way he distinguished himself from the pragmatism presented, for example, by Isaac Newton, who stated that "hypotheses (...) do not have place in experimental philosophy. In this philosophy, conclusions are derived from phenomena and generalized through induction. " This distinction into romantics and pragmatists has in principle not changed for hundreds of years and people can still be divided into those who feel more and those who try to describe the real world more in numbers. However, from the middle of the 19th century, when Mickiewicz's works were created, many things changed in the context of the proverbial "loupe and eye". The loupe or magnifier has been replaced by dozens or even hundreds of various tools that help scientists observe real world and the reality around them. One of many breakthrough tools that enabled us to observe and create the world on a nanometric scale (i.e. where the distances between objects are billions of times smaller than in the real world) is an electron microscope. Moreover, the nineteenth century loupe has changed into an entire arsenal of spectroscopic tools that allow to observe not only visible light but also what is before and behind the visible light on the spectral scale.



In our project, using synthetic tools provided by inorganic chemistry and organic chemistry, we are planning to utilize many of the twenty-first century loupes. Those will be an electron microscope, spectroscopic techniques, structural X-ray analysis and many others. Thanks to the combination of chemical methods and various analytical techniques, we try not only to describe the world which is 10,000 times smaller than the pinhead, but also try to build it again, based on our ideas. In the proposed project, we build this world with the use of gold nanoclaster, something between individual gold atoms, and nanoparticles, which are in simple approximation balls made of several hundred atoms of the metal. Nanoclusters are fairly easily to prepare, obtained and control by chemists, especially when it comes to the structure and techniques of their preparation. However, clusters do not have such interesting and strong optical properties as the nanoparticles themselves. In our project, we will try to strengthen the properties of clusters, so as to obtain prototype functional materials from them. Work on the development of new types of materials will be carried out at the University of Warsaw, in cooperation with the Faculty of Physics, University of Colorado and Hefei Institute of Physical Sciences, Chinese Academy of Sciences. The three basic goals of jont research are to obtain gold nanoclusters modified with other atoms, to create a new type of liquid crystalline substances and to create a new type of metamaterial. By modifying gold clusters, their interaction with light will be enhanced. Through the specific environment of these clusters, using organic molecules, we will be able to obtain modern materials, e.g. invisible (in certain ‘colors’ – light length ranges), or useful in chemical analysis techniques. Such substances will help in obtaining materials for cloaking various things, in particular in the context of military and telecommunications applications.