Cellulose is the most abundant biopolymer on Earth. It is recognized as a readily available and environmentally friendly raw material. It is therefore used in many industries, ranging from food, bio fuel, to the more sophisticated applications such as modern composite materials, biodegradable dressings, alternative energy sources, or in optoelectronics. Cellulose is a very inspiring material for the study due to its several unique properties.

The purpose of the project is to develop a hybrid material comprising a functionalized nanocellulose and nanoparticles of metals (palladium, platinum, copper or cobalt) embedded therein, and then testing the properties of such a composition. It is expected that conversion of macrocellulose to nanocellulose would provide a number of desirable properties, such as higher porosity, higher hygroscopicity, better thermal, mechanical and optical properties.

Metal nanoparticles, such as silver nanoparticles, are present in many everyday products such as textiles, paints, anti-bacterial surfaces, cosmetics. However, given the proven toxic effects of silver nanoparticles on the biosphere, solutions based on less toxic nanoparticles of metals should be considered. Embedding metal nanoparticles in the matrix would lead to minimisation of their emission to the environment.

Functionalization of nanocellulose will lead to such a derivative that allows to design of a new nanocellulose of non-linear topology. In such a modified structure of nanocellulose it would be possible to immobilise efficiently metal nanoparticles, which are intended to equip nanocellulose matrix with new properties such as catalytic and biocidal. Immobilization is justified in the context of limiting the migration of metal nanoparticles to the biosphere.