As an introduction...
Humanity has come a long way since we've developed - probably by accident - our first soap: from ash and animal tallow. And however unhygienic that combination may seem to us, the underlying chemistry is still present in our daily lives - we touch it every time we decide to wash our hands.
Soap is an excellent example of how chemistry can chanhe the character of a substance without any special effort: one reaction in this case is all that stands between the main cause of grease stains, and the perfect remedy to make those stains dissapear.

Surface active agents.
Soaps are only a representative of a large class of compounds that are commonly found not only in cosmetics (where they stabilize emulsions, act as detergents, perpetuate foam), but also in pharmaceuticals, technological and chemical processes. Their action is based primarily on the accumulation at the phase boundary (usually that is an oil-water interface) which helps mix them together. But not only molecules can be employed for such tasks. Also the functional materials, known as...

Janus particles.

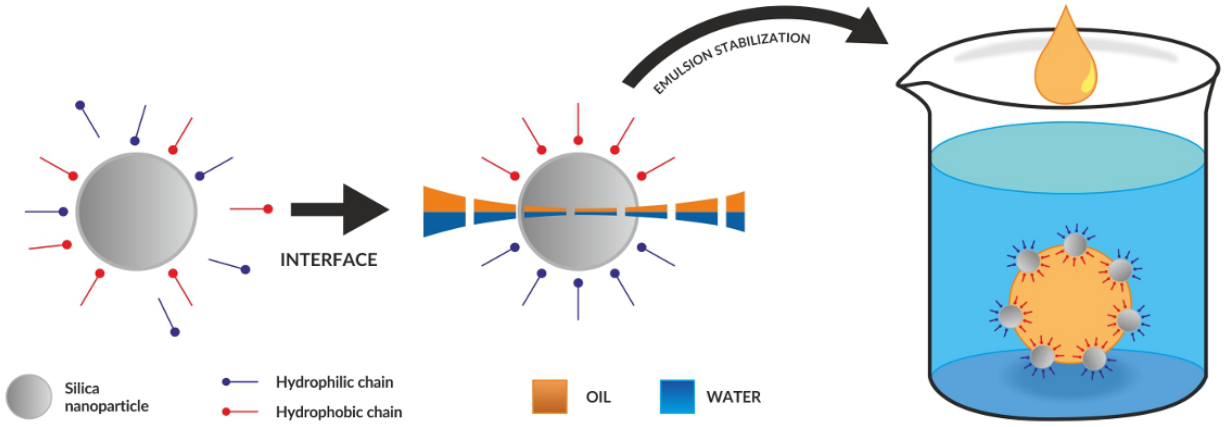
If a particle of an insoluble material has two faces - one preferring the aqueous solution, the second - non-polar environment, we are certainly talking about the namesakes of Roman, two-faced god. Their behavior in a biphasic system is analogous to a typical surfactant - particles associate at interfaces, and their insoluble nature improves the stability of the emulsion. Such spontaneous processes that take place without the participation of the chemist and without the creation of new compounds are of interest to a scientific discipline which is called...

Supramolecular chemistry.
Which is the chemistry of non-covalent - and thus reversible - interactions. One of the main objects of research in this field of chemistry are the processes of self-association and self-organization: the construction of more complex systems by their elements themselves (spontaneously or with an appropriate stimulus).

As a graduate of "cosmetic chemistry" specialization especially interested in surfactants, a PhD student that prepares his work in the Department of Supramolecular Chemistry and a chemist with experience in the synthesis of hybrid materials, **the research goal** I set for myself **is combinining these three scientific fields in order to obtain a completely new group of surface active agents**.

Specific reasons for this course of research are:
• lack of similar, mixed systems described in the literature
• the desire to see (using microscope techniques) and prove the processes of self-organization of proposed systems at the oil-water interface
• the innovative nature of the idea
• the conceptually close "Janus particles" struggle with synthetic complications and are not economically viable

Scientific concept.
The project aims to harness the potential for self-organization of the proposed systems in order to simplify the preparation of amphiphilic particles, while maintaining their advantages stemming from their mixed (material / compound) character. The following scheme shows how the theorized surfactants are supposed to form from three distinct elements: silica particles, chains with affinity for the aqueous phase and chains with affinity for the oil phase. Ionic forces will hold the ingredients (loosely) together, and in the presence of a phase boundary should allow for their favourable rearrangement.



During the course of this project, all components of the presented system will be synthesized, and their mixtures tested for their ability to stabilize emulsion system. Internal structure of these emulsion will be characterized using microscope techniques.