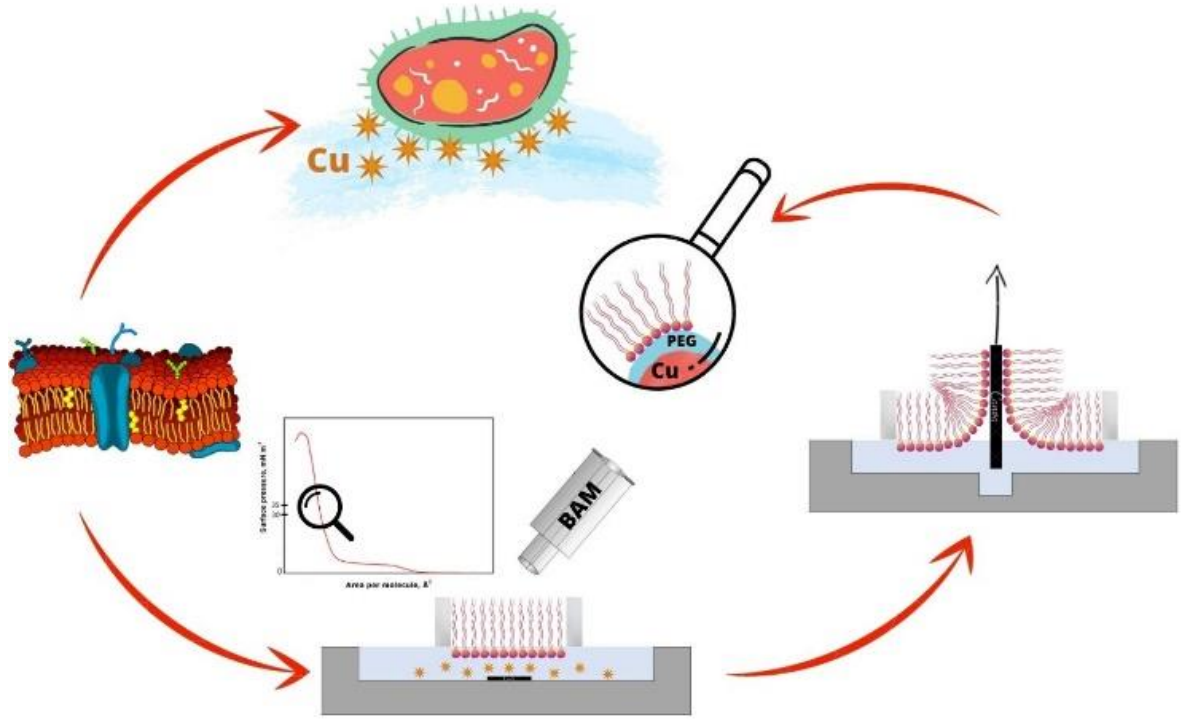
Biological membranes are ubiquitous in living organisms. They are composed of two layers of lipids and proteins. They provide protection against the surrounding external environment, but also allow cells to selectively interact with the environment. Due to the research difficulties of the biological processes that take place on the surface of the membrane or in its lipid bilayer, resulting from the high complexity of biological membranes, research in this area is performed with the use of biomimetic model membranes. It has been proven that their application allows the assessment of changes caused by foreign substances in the physicochemical properties of lipid layers. Therefore, we decided to check whether copper (Cu) and/or its compounds cause disturbances in the structure of model biological membranes, which we will form from the synthetic material DPPG phospholipid - which is the main component of most bacterial membranes, as well as biological material (lipids isolated from bacteria: *Legionella*, *Pseudomonas aeruginosa*, which are responsible for the majority of nosocomial infections, and *Escherichia coli* and *Staphylococcus aureus* - which the most often cause of infections in the human body). This will allow confirming the assumption that **the mechanism of the antibacterial action of copper and its compounds is based on disorders of the membrane of microorganisms**. This aspect will also be checked by microbiological methods, using the same type of bacteria. This will permit the verification of the proposed method, in which we assume that the study of material isolated from microorganisms makes it possible to predict the results of microbiological tests. On the other hand, the knowledge of the mechanism of Cu interaction with membranes is an indispensable element in the production of metallocarriers of active substances (e.g. drugs), as it will allow controlling the amount of the pharmaceutical incorporated into the carrier (and then released from it). However, in order for such a carrier to reach the target site, it should possess a sheat from a substance-friendly to a living organism. These above-mentioned, biomimetic membranes are not only considered good models of cell membranes but are also often used to modify the surface of various materials. Their use primarily improves biocompatibility with a living organism, e.g. improving blood compatibility, which is the environment for any biological reaction. In addition, worth it enhances such a carrier with other ingredients with useful properties, for example, polyethylene glycol (PEG), which acts primarily as a "penetration enhancer" increasing skin permeability to allow increased absorption of the drug product. The combination of PEG with copper (Cu) is already widely used in medical preparations, including for the production of dressings, sutures, bandages, and other medical materials with anti-infective, anti-inflammatory, and healing accelerating properties, or even recently in some vaccines against COVID-19. On the other hand, the proposed phospholipid envelope would enable better contact with the biological environment (tissues, membranes, cells).



Scheme showing the main research aspects, i.e. the influence of copper on the biological membranes of microorganisms using microbiological and biomimetic membrane techniques, and the modification of copper with the use of PEG and phospholipids.