The project's purpose is to investigate heat and mass transfer in the microscale chamber that ultimately shall contain bacteria or viruses. The chamber is to be undergone a photothermoablation process thanks to the presence of densely packed gold nanorods. In order to perform this, the optimization of the chamber should be studied. The bacteria deactivation takes place when the temperature exceed 50^{o}C, and the bacteria are said to be killed in the chamber, and their "vitals" cannot be returned. Therefore, it is essential to examine the presented topic in comparison with experiments and numerical methods.

The work assumes to design and carry out the temperature-drops-based experiments. In order to perform this, the high-temperature-calibrated thermal camera should be applied. The gold nanorods are to coat onto the base plate and to cover with the previous-prepared PDMS insulated material leaving an empty for fluids. It would be hereinafter called "germicidal chamber". Moreover, the researcher are going to attach the measures that enable to read the inlet and outlet pressures or velocities. This would be provided by small manometers or cameras with an appropriate magnification and resolution.

New experiments are the next part of the preliminary carried out ones in the La Sapienza University of Rome cooperation and are to continue the research for the different laser wavelengths, different nanorods and chamber sizes and for different fluids as well (air, water, glycerin etc.). Likewise, it is worth to examine different concentrations of gold nanorods on a selected surface, which would be provided by Rayleigh-Drude and Mie-Lorenz theories.

On the other hand, the numerical methods are sophisticated by the project performers and they are going to be used, which is the fluid-solid interactions (Smoluchowski temperature drop, Maragoni effect, Reynolds thermal transpiration, phase drop at boiling point), multiphase models (DPM-based models) and thermal radiation heat transfer (discrete ordinates methods (DOM) and dependence-included discrete ordinates methods (DIDOM)).

Moreover, in order to eliminate synergic effects, concerning the size distribution of gold nanorods, researchers are to implement to the simulation special conditions. However, they require time and comparison of their usefulness basing on the previous ones, which do not contain these effects. Nevertheless, the main results and inputs to science are to:

- establish precisely, which of the conditions should be satisfied in order to maximize the temperature;
- study the heat transfer in the microscale chamber between nanorods and fluids
- analyze the mass transfer as a result of free convection and their velocity and pressure profiles in selected cross sections;
- investigate theoretically interaction between bacteria/viruses and fluid based on the Lagrangian-based models.