The aim of the project is to determine the effect of diversified process parameters on the efficiency of biohydrogen generation via biological processes. Currently, 90% of the energy carriers used are of fossil origin and their use is associated with the emission of carbon dioxide to the atmosphere. The interest in the production and use of fuels originated from sewage, landfill, animal waste, organic waste and energy crops, for sustainable development of economy and society in an eco-friendly manner is rising. Therefore, biogas, biohydrogen and biorafination are topics of a great interest among alternative energy sources.The main advantage of this type of biofuels is their production from biomass and from energy crops. As mainly residues are considered, there is no needed to allocate new land for cultivation of agricultural raw materials
The amount of this waste can be equal up to 15% of the total waste amount received at the landfill. Therefore, the authors see a certain niche to carry research ensuring improvements in the application of bio waste to generate biohydrogen. This type of waste management will benefit the environment by eliminating the need for their recycling, which can result in the reduction of greenhouse gas emissions that can be achieved using these biofuels. The general concept of the project is presented in the figure 1.

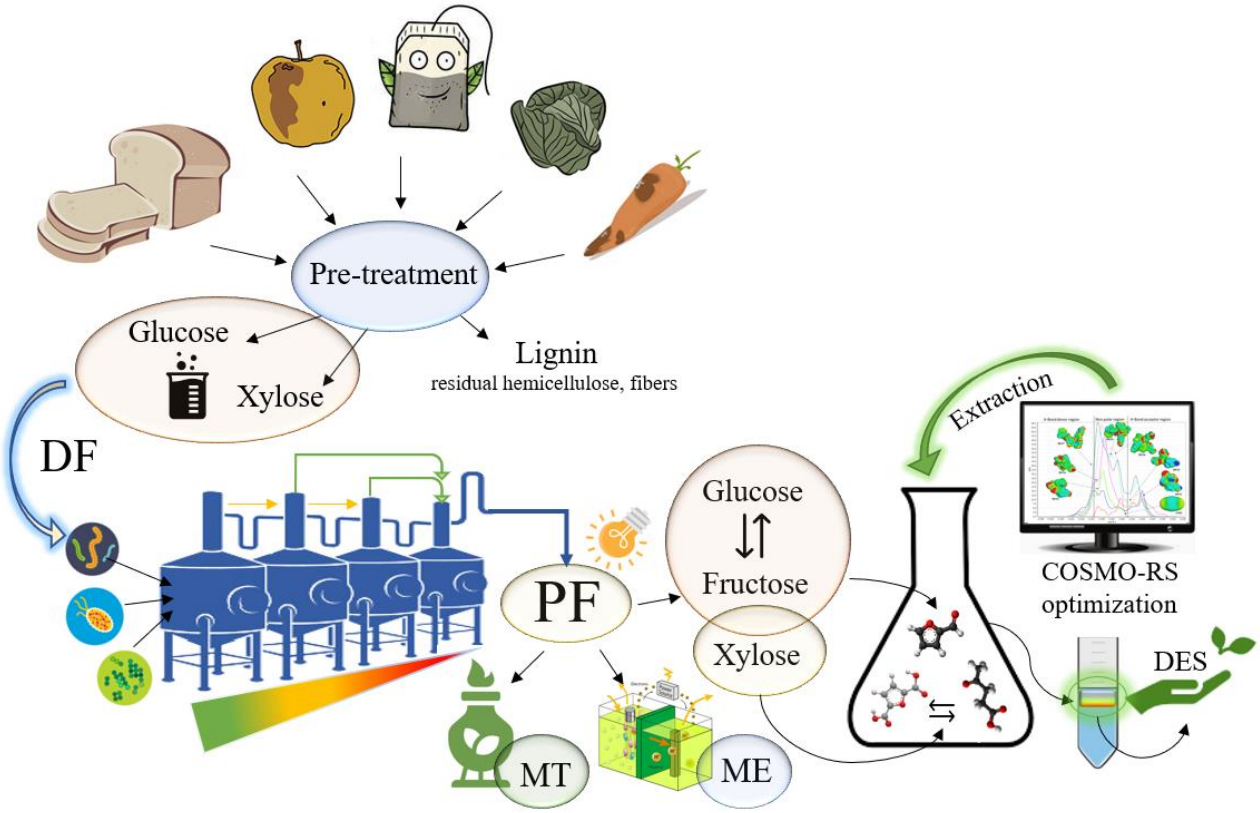

Figure 1. General concept of the project (*DF-dark fermentation, PF –photofermentation, MT-methanisation, ME- microbiological electrolysis, DES- green solvents, COSMO RS –software type*).

The project covers the pretreatment of bio waste fraction with the application of chemical methods. The further step covers culture of dark fermentation microorganisms and their adaptation to fermentation of hydrolysates obtained from biomass and usage of the post-fermentation broth containing organic acids in photofermentation. The dark fermentation will be carried in a continuous rotary system and the photofermentation will be realised with a foreign partner, University of Valladolid, Spain. Since post fermentation broth will raise, ceratin methods of purification are planned to be applied, i.e. biorefining, methaniztion or microbiological electrolysis.
Summarasing, the authors propose investigations on a multistep bioconversion process allowing to obtain purified biohydrogen stream generated during dark fermentation, photofermentation that enable a self-production of green solvents precursors during biorefining. As a result of the project, the authors expect to gain insight into the mechanisms of acid pretreatment of starch and lignocellulose bio waste fraction, to develop the dark fermentation and photofermentation course and increase the biohydrogen yield. Methods for broth management will be also considered. During biorafination generation of green solvents is expected. The same solvents are used as precursors for substances enabling to purify the generated gas stream. The project resluts are expected to be a significant contribution to the research in the field of biohydrogen and green solvents simultaneous generation.