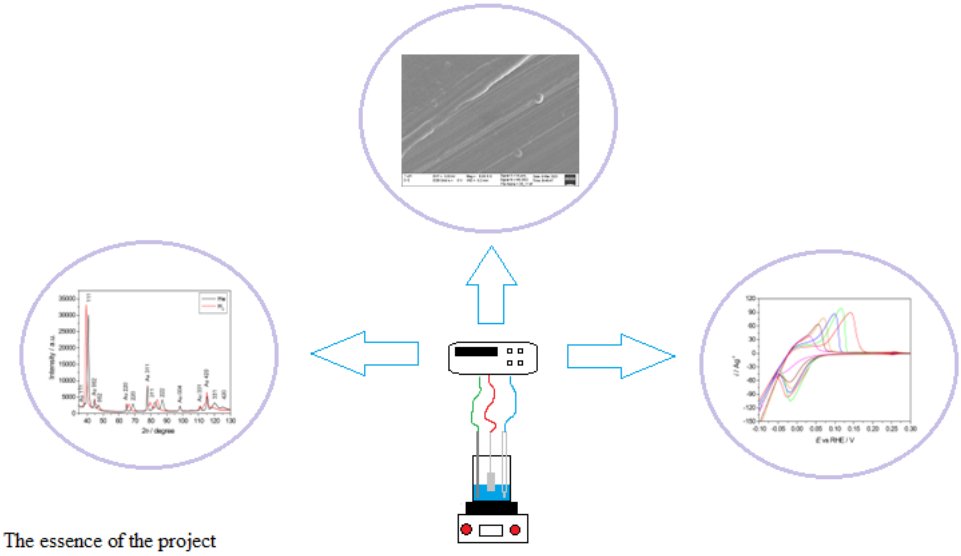
Recently, the search for new energy sources has become particularly important. In the face of the energy crisis, the idea to use hydrogen as alternative fuel seems to be very attractive. In the battery applications hydrogen is stored as a hydride of the anode material.



The essence of the project

Mg-based (magnesium-based) alloys are promising materials to be used as an anode material in Ni-MH (nickel-metal hydride) batteries due to the high electrochemical capacity and low cost resulting from abundant natural resources. However, Mg-based alloys do not operate long enough in concentrated alkaline media what is caused by corrosion. To solve this problem many researchers have been concentrated on different modifications of the anode material, but without significant progress. In this project the limitation of corrosion process of the anode will be achieved by the use of non-aqueous electrolytes. In the frame of the proposed research ionic liquids are considered as a promising candidates to successful replacement of the standard aqueous electrolytes used in hydride batteries.

During realization of this project different compositions of binary Mg-Ni (magnesium-nickel) alloys will be synthesized through electrodeposition from non-aqueous baths. The project authors predicts that the process of hydrogen sorption will be hindered in protic ionic liquids thus some surface modifications (eg. with palladium (Pd) thin films) of obtained alloys are also considered.

Synthesized anode materials will be thoroughly characterize with the use of physicochemical and electrochemical methods. The main focus will be put on the obtaining high hydrogen sorption capacities and long operating time of the studied systems in ionic liquids. The final result of the project will be the elaboration of the specific system of Mg anode-ionic liquid electrolyte for the efficient, further application in non-aqueous protonic batteries.

The use of Mg-Ni-based anode with the ionic liquid electrolyte constitutes innovative solution in the field of rechargeable protonic systems (RPSs) and has not been presented in the literature so far. Achieving the objectives of the presented project is expected to influence strongly the further development of the RPSs and Mg-based anodes.

The project will be realized by the research group located at the Faculty of Chemistry, University of Warsaw (UW) in collaboration with Faculté des Sciences, Université Libre de Bruxelles (ULB) and the Institute of Chemistry and Technical Electrochemistry, Poznan University of Technology (PUT).