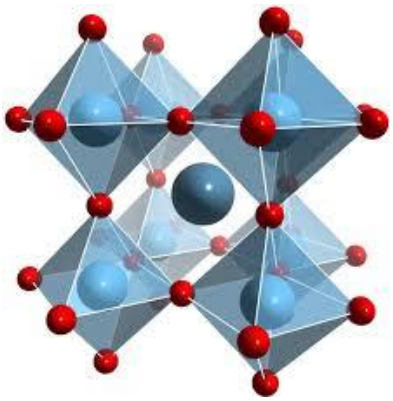
Nowadays, the renewable energy resources are hugely appreciated due to environment pollution concern and the climate changes. This project aims to develop the photovoltaic devices as a main green renewable energy source in the last decades. Despite the fact that since 2000 the production of photovoltaic cells in the world has been growing at a rate of about 40% annually, the problem still remains the cost of cells, efficiency, and the availability of materials for their production.

One of the main materials which is used for fabrication of solar cells is $CH_3NH_3PbI_3$ which is an organic-inorganic halide perovskite material. This fastest improving solar technology are called perovskites. Perovskites have a particular crystal structure that is good for solar absorption. Thin films, around 300 nanometers (much thinner than a human hair) can be made inexpensively from solutions - allowing them to be easily applied as a coating to buildings, cars or even clothing. work better than silicon at lower lighting intensities, on cloudy days or for indoors. You can print them using an inkjet printer, or you can paint on a substrate, and you have a photovoltaic device. With such a cheap, flexible, and efficient material, you could apply it to street furniture to power free smartphone charging, public wifi, and air quality sensors, he explains. Perovskite cells have a high performance and a cheaper price than the conventional Si solar cells. However, the toxicity of the elements used in the structure of perovskite materials and instability of their performance is a barrier for their commercialization.

We aim to address this problem in this project both by performing modeling and simulation as well as the experimental analysis. In this research project, we will develop the performance stability of perovskite solar cells using less toxic and reliable materials based on Bi and Sb elements instead of the conventionally used Pb toxic component in most perovskite-based solar cells. The conventional state of the art perovskite solar cells is made of Pb (lead) based perovskite materials which is extremely toxic and must be replaced with safer element for commercialization of perovskite solar cells. We will perform theoretical simulation analysis on Bi/Sb perovskite materials which will support the chemical processing. Our research will facilitate the development of more efficient and stable solar panels in near future.



The research planned in this project is in line with the strategy Europe 2020, especially target 2 (R&D / innovation) and 3 - Climate change / energy, the Union of Innovation. They also perfectly fit into the assumptions of Strategic Energy Technology Plan and the Energy Road Map 2050.