English Abstract: To fulfill the multiple requirements for energy production, this project focuses on employing heterogeneous nano-fibers photocatalysts based on anodic aluminum oxide (AAO) templates to develop efficient energy-conversion devices. To fabricate complementary photocatalysts, the synthesized photocatalysts will be designed to work in the visible and UV region of the sunlight. So, we focus on synthesizing of CdS and TiO_2 as heterogeneous nano-fibers photocatalysts. In addition to the usage of graphene oxide (GO) and gold layers, in which GO will be used as a current collector that enhances the absorbance of the photocatalysts to the sunlight, and Au will be used as a surface plasmon layer to increase the enhancement of the absorption process.

The heterogeneous nano-fibers photocatalysts (CdS/TiO_2/GO/Au) will be synthesized by using the aluminum template with certain pore diameters. The preparation of this nano-fiber will be carried out by chemical and electrochemical methods, in which the layers of both CdS and TiO_2 will be prepared by spray pyrolysis method. The GO layer will be prepared by the electrodeposition method from the GO solution. Finally, the deposition of Au layer will be occurred by sputter coating method. The characterization of the fabricated photocatalysts will be carried out using SEM, XRD, EDX, and TEM and then measuring their optical and electric properties.

After the preparation of the heterogeneous nano-fibers photocatalysts, we can apply them as an anode in the dye synthesized solar cell to enhance its efficiency to reach > 6 %. This occurs by mixing the prepared nano-fibers with certain organic dyes that increase the absorbance process to reach the maximum percent of the absorbance that gives us the best efficiency. Also, we will apply the heterogeneous nano-fibers photocatalysts in the efficient hydrogen generation from the sea water. This project will provide simple, rapid, and low-cost techniques that can be applicable easily in the industry for energy conversion devices.