



Concept

The traditional industrial processes involving the consumption of fossil fuels have a great impact on global warming and environmental pollution. Therefore, the development of new, eco-friendly, and clean industrial processes based on the use of renewable energy has emerged as the most pressing challenge for researchers working in the green chemistry field. The transformation of biomass into hydrogen (H₂) and valuable products is a promising approach to counter the negative impacts caused by the excessive consumption of fossil fuels. Natural biomass is a renewable energy source that does not emit greenhouse gases because it is created by plants during photosynthesis from CO₂ and water. Moreover, drugs are challenging to remove from water systems through traditional wastewater treatment methods. Photocatalytic technology can be considered a "green" and low-cost technique to produce H₂ and high added value compounds from biomass and wastewater under mild conditions, using oxygen as an oxidant, and sunlight as irradiation sources.

Scientific approach

In recent times, sustainable, safe, and clean energy supply is one of the technological challenges that the scientific world faced with high intensity. The conversion of solar energy into chemical energy with the formation of renewable fuels through green processes has significant advantages over traditional methods. Moreover, due to the rapidly growing demand for various products to treat humans and animals, pharmaceutical companies are expanding significantly. Molecules of pharmacological importance present in drugs are widespread in the environment. In seawater, lakes, rivers, surface waters, urban wastewater and drinking water, their concentrations have been found to range between ng and µg per liter.

To overcome these problems, this project is focused on the synthesis of cheap, non-toxic, and environmentally friendly photocatalysts and their applications in the lab and pilot plant scale for the production of H₂ and high added value products through the utilization of biomass and organic drugs under solar irradiation.

Research objectives

Research project aims

- Synthesis of cheap, non-toxic and efficient photocatalysts
- Valorization of biomass derivatives
- Production of H₂ and high added value compounds
- Removal of drugs from the wastewater
- Efficient photocatalytic production of H₂ in pilot-scale plants

