

Functionalized Porous-Carbon Composite with Attached Metal Nanoparticles for CO₂/CO Capture and Utilization (*New - Fall 2018*)

Faculty advisor: Prof. Hani Naguib

CO₂ is one of the greenhouse gases with high impact in the global warming. Although a natural cycle regulates CO₂ concentration by photosynthetic organisms, the large-scale burning of fossil fuels has increased considerably the amount of CO₂ in the atmosphere. The project here described presents a novel solution for CO₂ sequestration from the atmosphere in ambient conditions and low CO₂ concentrations. The double functionalized open-cell structure made of a polymer/activated carbon composite with metal oxide nanoparticles as a catalyst also presents high cyclability for regeneration. As a second stage, the CO₂ is transformed into a reusable source of energy through electrochemical reduction. Therefore, a complete sustainable carbon cycle can be achieved. Furthermore, the manufacturing techniques and design of the system facilitate the scalability and adaptability of the project, which can be used in both conditions, flue gases produced by industry and direct CO₂ sequestration from the air.