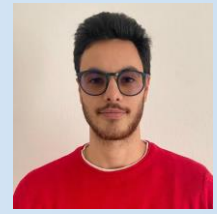
# Ammonia Electro-oxidation for Hydrogen Production



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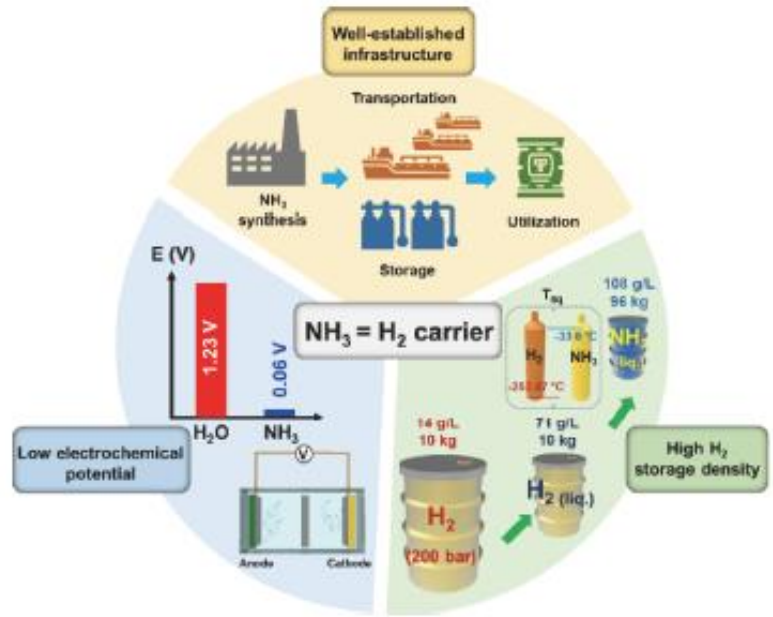
## Electrochemical Green Hydrogen Production

**Concept**

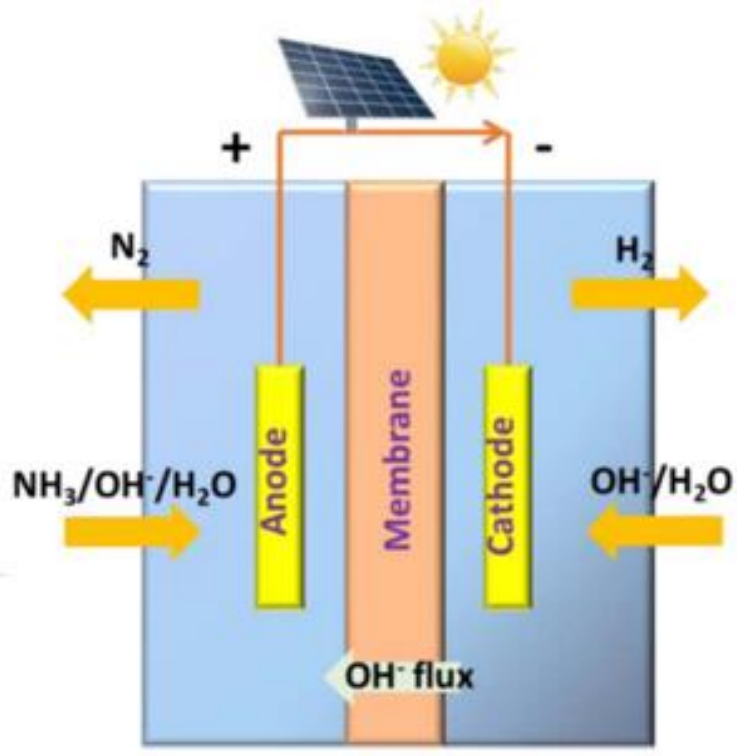
In recent years, the trend toward progressive decarbonization of raw material and power generation processes has drawn much attention to hydrogen. However, transportation and storage of this substance pose serious problems, given the difficulty in liquefying it and its high flammability. As a solution to these problems, it has been hypothesized to use ammonia as a "container molecule," which can rely on an established infrastructure network. For this solution to be viable, it is necessary to develop a process that allows hydrogen to be obtained from ammonia at low cost. This project aims to identify the ideal combination of electro-catalyst at the cathode, electro-catalyst at the anode, separators, and cell design that will allow the process of hydrogen production by electro-oxidation of ammonia to be implemented with sustainable costs.





**Scientific approach**

The focus will be on the anode since is the part of the cell where the ammonia oxidation occurs. Different electrocatalysts will be prepared via electrodeposition of metals on different substrates. These electrocatalysts will be tested in three electrodes cells. Cyclic voltammetry, electrochemical impedance spectroscopy and potentiostatic runs will be used to characterize these electrodes in terms of their activity towards the reaction, stability in the environment in which the reaction will occur and selectivity between the two main products of ammonia oxidation (nitrates and nitrogen). The metals to test will be choose in taking into account their affinity with ammonia, their toxicity, and their price so metals of the platinum group will be avoided. Once a combination of substrate and electrocatalytic layer that reach satisfying performances will be found both for the anode and the cathode, the cell design will be studied to improve the performances.




**Research objectives**

This project aims to develop an electrolyzer, on lab scale, for the hydrogen production, based ammonia oxidation as the anodic reaction instead of oxygen evolution, using PGM free and not toxic materials.