UNIVERSITÀ
DEGLI STUDI DI MILANO-BICOCCA

SYLLABUS DEL CORSO

Technologies for Production and Conversion of Green Hydrogen

2425-116R-M08

Title

Technologies for production and conversion of green hydrogen

Teacher(s)

Prof. Carlo Santoro

Language

English

Short description

The course aims to provide a description of the electrochemical systems for the production and conversion of green hydrogen. The course will focus on materials and reaction mechanism with particular attention to fuel cells and water electrolyzers. Within the course, reactions mechanism occurring on the electrodes, electrochemical processes, electrodes and electrolyte synthesis methods, technological operation and electrochemical performance will be evaluated.
The following topics will be addressed.
LECTURE 1 (2h)
Title: Hydrogen vector and electrochemical tools

Hydrogen as green vector; production of hydrogen (status and perspective); green hydrogen production; green hydrogen within the EU decarbonization goal for 2050.
LECTURE 2 (2h)
Title: Electrolyzers with focus on materials and performance
Type of electrolyzers (AEL, PEMEL, AEMEL, SOEC, CO2 electrolyzers); reaction mechanisms involved (hydrogen evolution reaction, oxygen evolution reaction); identification of performance, polarization curves, losses, durability issues;
organic, inorganic and hybrid materials for electrocatalysts and membranes/separators.
LECTURE 3 (2h)
Title: Fuel cells with focus on materials and performance
Type of fuel cells operating with gaseous feedstock (PEMFC, AEMFC, AFC, MCFC, SOFC); reaction mechanisms involved (hydrogen oxidation reaction, oxygen reduction reaction)
Identification of performance, polarization curves, losses, durability issues; organic, inorganic and hybrid materials for electrocatalysts and membranes.
LECTURE 4 (2h)
Title: Overcoming limitations and perspectives
Identification of gaps in electrolyzers, fuel cells and solution proposed.

CFU / Hours

1 CFU / 8 hours

Teaching period

February 17th, 2025- 230-430 pm
February 18st, 2025 - 230-430 pm
February 19nd, 2025 - 230-430 pm
February 20rd, 2025 - 230-430 pm

Sustainable Development Goals

AFFORDABLE AND CLEAN ENERGY