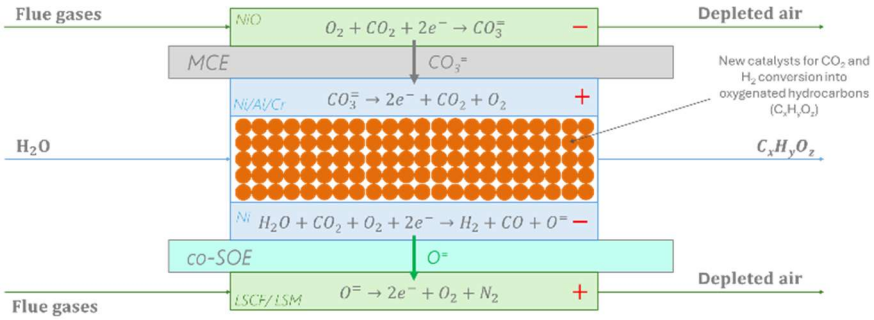
NARODOWE CENTRUM NAUKI

SHENG 4 – Polish-Chinese Funding Initiative

Call for proposals 2024/2025

Streszczenie popularnonaukowe w języku angielskim

As the world faces increasing challenges related to CO_2 emissions and the urgent need for sustainable fuels, researchers from Poland and China have joined forces in the **CALYPSO** project. The goal of this research is to develop an innovative technology that enables direct CO_2 capture from exhaust gases and its conversion into chemical compounds essential for producing **sustainable aviation fuels (SAF)**.



The CALYPSO project integrates two advanced electrochemical technologies: **Molten Carbonate Electrolyzer (MCE)** and **Solid Oxide Electrolyzer (SOE)**. This novel approach will capture CO_2 and transport it in the form of carbonate ions (CO_3^{2-}) to specialized reactors, where, in the presence of hydrogen, it will be transformed into **oxygenated hydrocarbons**, key precursors for fuel synthesis:

- **Advanced CO_2 capture** – Instead of merely storing carbon dioxide, as in traditional methods, CALYPSO will **immediately convert it into useful chemical compounds**.
- **Cutting-edge catalysts** – The project will develop new materials to enhance the reaction of CO_2 with hydrogen, making the process more efficient.
- **Energy-efficient approach** – The hybrid combination of MCE and SOE technologies allows for optimized energy use.
- **Industrial potential** – If successful, this method could be applied in **refineries, power plants, and chemical industries** to help reduce CO_2 emissions.

The project is led by scientists from **Warsaw University of Technology**, under the supervision of **Prof. Jarosław Milewski**, and **North China Electric Power University**, with **Prof. Ligang Wang** as the Chinese lead. The team collaborates with leading research institutes specializing in modern fuel synthesis methods.

The CALYPSO project has the potential to **significantly reduce greenhouse gas emissions** while simultaneously **creating a new, eco-friendly source of fuel**. The developed technologies could be applied not only in aviation fuel production but also in **the chemical and energy industries**.
Through CALYPSO, we are taking a step toward a more **sustainable future**, where **CO_2 is not seen as waste but as a valuable raw material for producing next-generation fuels**.