Atomically Dispersed Bifunctional Catalysts for Reversible Zn-CO2 Batteries

Fact Sheet

Project Information

ADBCRZB
Grant agreement ID: 891545

DOI
10.3030/891545

Funded under
EXCELLENT SCIENCE - Marie Skłodowska-Curie Actions

Total cost
€ 203 149,44

EU contribution
€ 203 149,44

Start date
1 October 2020

End date
30 September 2022

Coordinated by
ECOLE POLYTECHNIQUE FEDERALE DE LAUSANNE
Switzerland

Project description

High-performance zinc–carbon dioxide battery thanks to single-atom catalysts

Carbon dioxide (CO2) concentrations have surpassed levels seen in the entirety of human history. Coupling CO2 utilisation with electrochemical storage is viewed as a promising technology for generating electricity and decreasing harmful gas emissions. The EU-funded ADBCRZB project plans to develop zinc–CO2 batteries using single palladium atoms as a catalyst for the cathode. Scientists will employ operando spectroscopy and conduct simulations to probe the reaction mechanism of catalysts. The project will demonstrate the great potential of single-atom catalysts for
CO2 conversion, and it will also offer a significant boost to the development of the relatively new Zn-CO2 battery technology.

**Objective**

Atmospheric carbon dioxide (CO2) has increased from 278 to 415 ppm over the industrial period and has critically impacted climate change. Coupling CO2 utilisation with electrochemical energy storage devices, such as metal-CO2 batteries, represents a promising clean strategy to deal with greenhouse gas effect and energy dilemma simultaneously. We propose to develop an aqueous Zn-CO2 battery prototype based on CO2-HCOOH conversion for high-efficiency energy storage. To achieve this goal, bifunctional Pd-based single-atom catalyst cathodes will be exploited to drive CO2 conversion with high activity and selectivity. We will then probe the reaction mechanism of catalysts by operando analytical tools together with density functional simulations. Moreover, bipolar membrane, gas diffusion electrode, and ionic liquids will be used as alternative approaches to enhance the Zn-CO2 battery performance at cell level. This project is expected to make a significant step forward in the exploitation of single-atom catalysts for CO2 conversion, and accelerate the development of emerging Zn-CO2 batteries. The project also includes a comprehensive training program to enhance the future career prospects of the fellow.

**Fields of science**

natural sciences › chemical sciences › catalysis
natural sciences › earth and related environmental sciences › atmospheric sciences › climatology › climatic changes

**Programme(s)**

H2020-EU.1.3. - EXCELLENT SCIENCE - Marie Skłodowska-Curie Actions **MAIN PROGRAMME**

H2020-EU.1.3.2. - Nurturing excellence by means of cross-border and cross-sector mobility

**Topic(s)**

MSCA-IF-2019 - Individual Fellowships

**Call for proposal**
H2020-MSCA-IF-2019

See other projects for this call

Funding Scheme

MSCA-IF-EF-ST - Standard EF

Coordinator

ECOLE POLYTECHNIQUE FEDERALE DE LAUSANNE

Net EU contribution

€ 203 149,44

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Switzerland

Region

Schweiz/Suisse/Svizzera > Région lémanique > Vaud

Activity type

Higher or Secondary Education Establishments

Links

Contact the organisation
Website
Participation in EU R&I programmes
H2020 collaboration network

Non-EU contribution

€ 0,00

EC signature date: 5 March 2020
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