https://www.methasol.eu

METHASOL

CO_2 TO CH_3OH

INTERNATIONAL COOPERATION FOR SELECTIVE CONVERSION OF CO_2 INTO METHANOL UNDER SOLAR LIGHT

This project has received funding from the European Union's Horizon 2020 research and innovation programme under grant agreement No. 101022649 (METHASOL).
This output reflects only the author's view and the European Union cannot be held

Deliverable Report

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Nature of the Deliverable		
R	Document, report (excluding the periodic and final reports)	X
DEM	Demonstrator, pilot, prototype, plan designs	
DEC	Websites, patents filing, press & media actions, videos, etc.	
OTHER	Software, technical diagram, etc.	

Dissemination Level		
PU	Public, fully open, e.g. web	X
CO	Confidential, only for members of the consortium (including the Commission Services)	

Quality procedure			
Date	Version	Reviewers	Comments

PROJECT SUMMARY

This report is part of the deliverables from the project "METHASOL" which has received funding from the European Union's Horizon 2020 research and innovation program under grant agreement No. 101022649.

Methanol is an appealing energy vectors, with attractive volumetric and gravimetric energy values, storable in liquid phase at ambient conditions of pressure and temperature, and that can be used as fuel directly or converted into chemicals or gasoline. However, its production lacks a sustainable route. Thus, the METHASOL project aims to produce methanol through a sustainable and cost-effective process based on the selective visible light driven gas phase CO_2 reduction, with a solar to methanol energy conversion efficiency of 5%. During 42 months, METHASOL will gather 14 partners from EU/Associated MS, China and the USA, including some of the world's most recognized researchers on artificial photosynthesis, to achieve a ground-breaking combination of a CO_2 reduction reaction (CO_2RR) system based on Metal-Organic Framework (MOF) and a graphitic Carbon Nitride (g-CN) for photocatalytic oxygen evolution reaction (OER), through a Z-scheme heterojunction. Following the definition of the system specifications (WP1), a first set of materials for OER and CO_2RR will be synthesised and their photocatalytic activity and stability will be screened (WP2). The most promising materials will be further analysed thanks to experimental characterisation and modelling (WP3), leading to guidelines used for designing an enhanced CO_2RR and OER materials (WP4). The best systems will then be integrated through a Z-scheme heterojunction, either with or without a mediator, and tested in tailored reactors operating in the gas phase under different conditions (WP5). A complete sustainability analysis will be conducted (WP6) to ensure the clean production of methanol. The cooperation between European and Chinese research entities will be consolidated to last beyond the project lifetime through the creation of a common exploitation plan (WP7). Through its ambitious activities on photocatalyst developments for solar to methanol conversion, METHASOL will propose a new path for decarbonizing Europe.

More information on the project can be found at https://www.methasol.eu.

OBJECTIVE AND EXECUTIVE SUMMARY

This report will be the result of an executive meeting organsied between T7.1 partners to fix the details of students exchange, senior researcher visits for talks and seminars, and at least 2 joint conferences (one in EU, one in PRC) for teambuilding and finalization of the project.

Throughout COVID, digital and hybrid formats will be applied until international traffic is reestablished.

LIST OF PARTNERS

N°	Name	Short name	Country
1	UNIVERSITAT POLITECNICA DE VALENCIA	UPV	Spain
2	MAX-PLANCK-GESELLSCHAFT ZUR FORDERUNG DER WISSENSCHAFTEN EV	MPIKG	Germany
3	Wuhan University of Technology	WHUT	China
4	CENTRE NATIONAL DE LA RECHERCHE SCIENTIFIQUE CNRS	CNRS	France
5	IMPERIAL COLLEGE OF SCIENCE TECHNOLOGY AND MEDICINE	ICL	United Kingdom
6	DALIAN INSTITUTE OF CHEMICAL PHYSICS, CHINESE ACADEMY OF SCIENCES	DICP	China
7	ECOLE NORMALE SUPERIEURE	ENS	France
8	ECOLE POLYTECHNIQUE FEDERALE DE LAUSANNE	EPFL	Switzerland
9	FUZHOU UNIVERSITY	FZU	China
10	TECHNION - ISRAEL INSTITUTE OF TECHNOLOGY	TECH	Israel
11	NANKAI UNIVERSITY	NKU	China
12	UNIVERSITEIT MAASTRICHT	UM	Netherlands
13	METHANOL INSTITUTE	MI	United States
14	EUROQUALITY SARL	EQY	France

TABLE OF CONTENTS

1. INTERNATIONAL EXCHANGE AND COOPERATION

This point is to be separated between the exchange within the EU partners and exchange between China and Europe.

EU-China Exchange

The funding and planning of the two programs on EU and China side could at the beginning not be synchronized, which is due to different political decision making and funding priorization. We now can expect funding answer if there is a Methasol mirror construction in spring 2022. This would give our Chinese partners the possibility to finance their research and other interests, which is currently executed only on voluntary base.

This delay is a minor problem, as the real roadblock in international exchange is the COVID crisis and the way how this pandemia is handled on EU and on Chinese side. This rather strict isolation policy of China makes short-term visits in both directions practically impossible (travelling to China relies on special visas not granted in all cases and comes with quarantine isolation of up to 6 weeks per case). According to the International Relation Office of the MPG, this situation must be expected to hold true at least to the end of 2022.

In case of successful funding of the Chinese partners, we therefore plan a virtual, internet-based start-up symposium to establish at least common grounds, for June/July 2022. This is to be synchronized with the corresponding EU invent.

EU Internal exchange

Inside the EU, 4th and the foreseeable 5th Covid wave have made intereuropean travelling very difficult again. We therefore only can repeat our current plannings, which are already under threat by the current development.

a) **First Face-to-face meeting of the EU Methasol Groups (**2 days, planned for June/July 2022. Potential locations : Potsdam or Valencia. It is intended that these meetings are held around the locations of the major partners with sufficient planning infrastructure and train/plane accessibility.
The meeting would be available also in Hybrid mode, e.g. for the Chinese partners if interested and possible.
In case of new Covid restrictions, this conference would be extended to 3 days and included the EU-China meeting as a subprogram point.

b) Exchange of PhD students, visits of senior researchers in partner labs
PhD students and Post-Docs can apply for internships in partner labs for 1 – 4 weeks, depending on scientific progress and technical needs. These could be managed between the two individual partners, but must be communicated to the management structure, for instance the subprogram manager of 7.2. (MPI-KG) who also can give organizational support. Senior researchers are encouraged to invite and visit each other for intensified exchange and face discussions with the involved teams. Also these visits are to be documented.