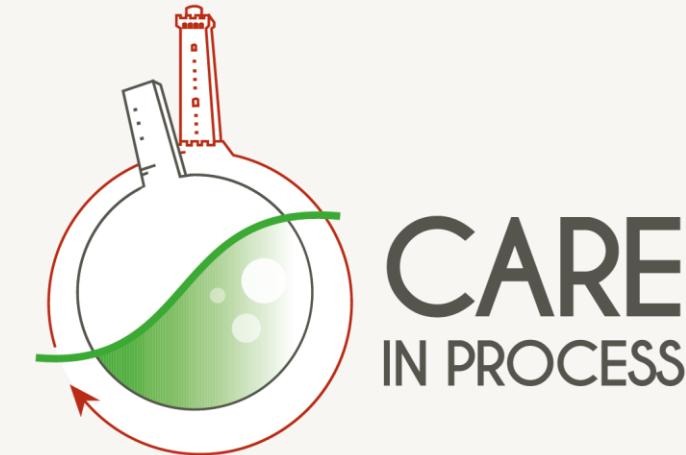


# **Area di Chimica Industriale: Sviluppo Processi Catalitici**

**Dipartimento di Chimica  
Industriale «Toso Montanari»**

**CATALYSIS FOR RENEWABLES AND  
INNOVATIVE PROCESSES «CARE IN PROCESS»**



<https://site.unibo.it/catalysis-for-renewables-and-innovative-processes/en>

# WHO WE ARE

Prof.ssa Stefania Albonetti

Prof. Francesco Basile

Prof.ssa Patricia Benito

Prof. Fabrizio Cavani

Prof. Tommaso Tabanelli

Prof. Nikolaos Dimitratos

Prof. Giuseppe Fornasari

Dott. Andrea Fasolini

Dott. Alessandro Allegri

Dott. Jacopo de Maron

Prof Carlo Lucarelli (UnInsubria)

~ 20 PhD students and  
Post-doc Post-Doc  
Research Fellows



# GENERAL APPROACH

Catalyst  
Preparation

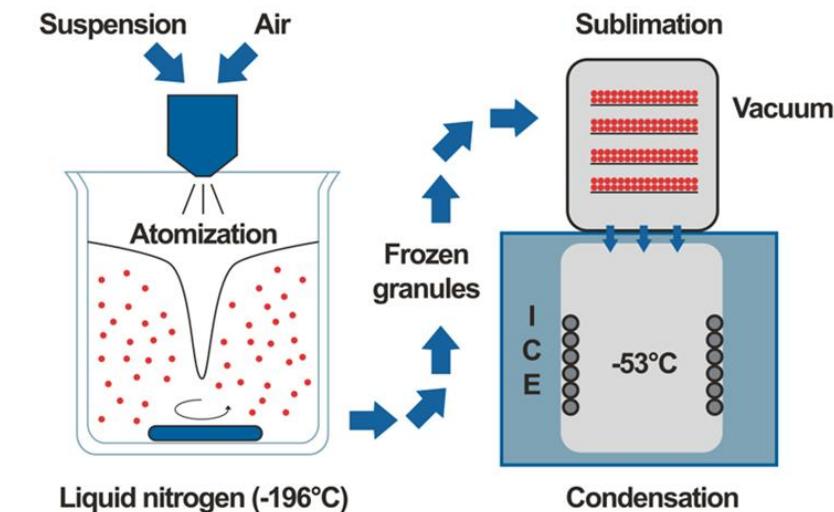
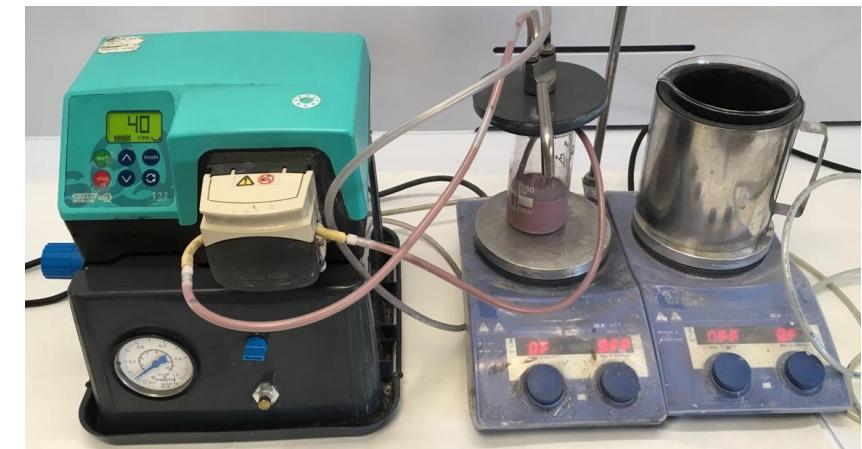
(Co-)Precipitation



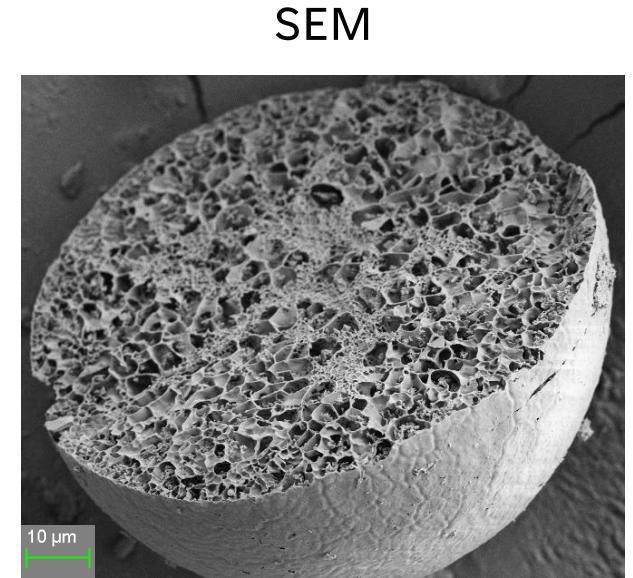
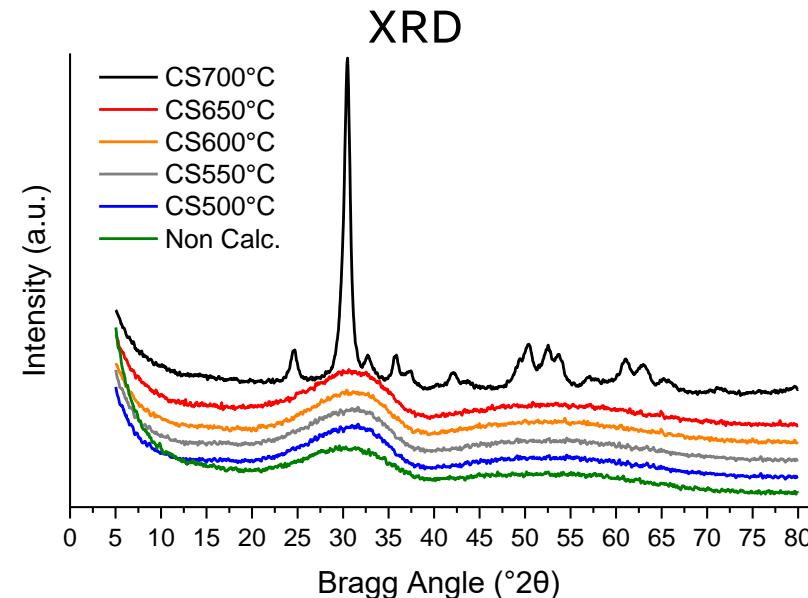
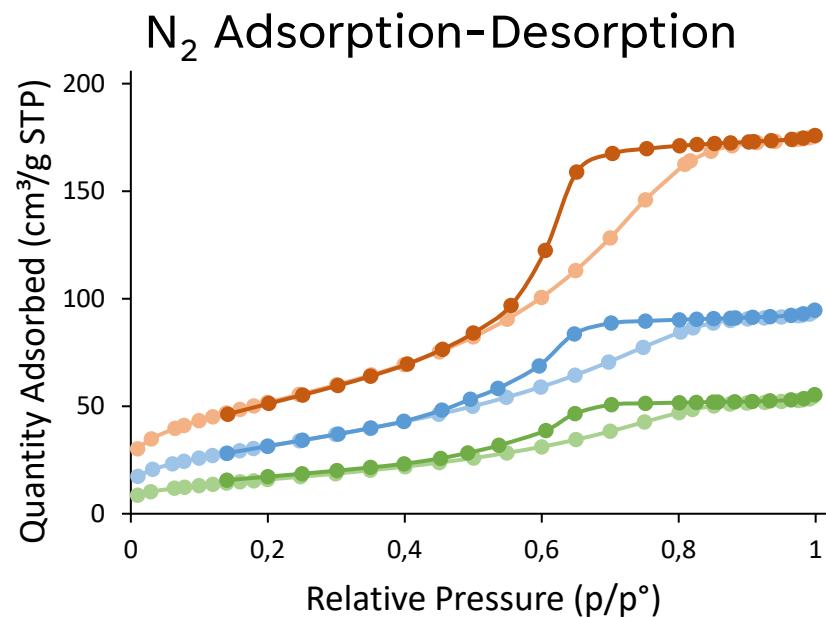
Sol Immobilization  
Incipient Wetness Impregnation



Spray-Freeze Drying



# GENERAL APPROACH



...and others like:  
XRF, TPD-R-O,  
(DR)UV-Vis, etc.

# GENERAL APPROACH

Catalyst Preparation

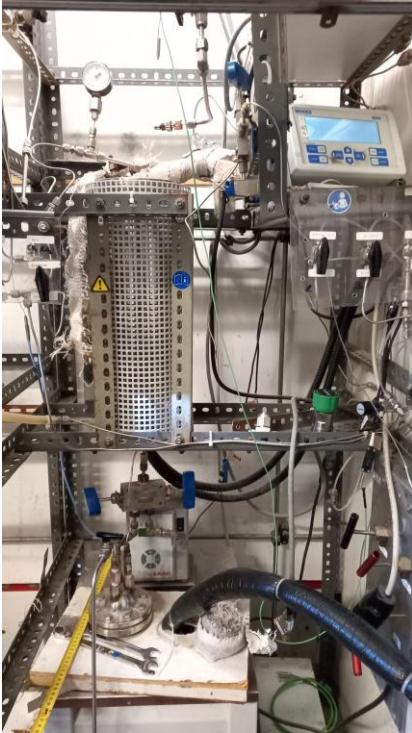


Catalyst Characterization

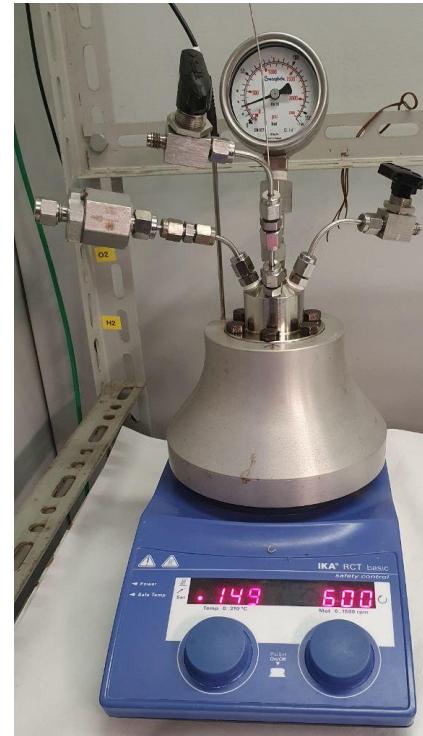


Catalytic activity

Gas Phase  
Continuous Flow Reaction



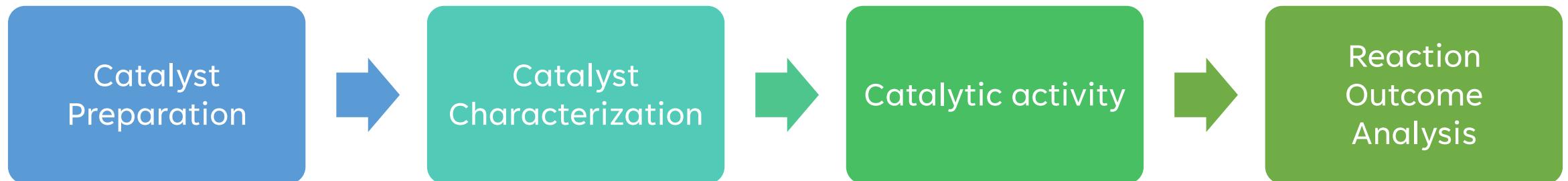
Liquid Phase  
Batch Reaction



Liquid Phase  
Continuous Flow Reaction



# GENERAL APPROACH



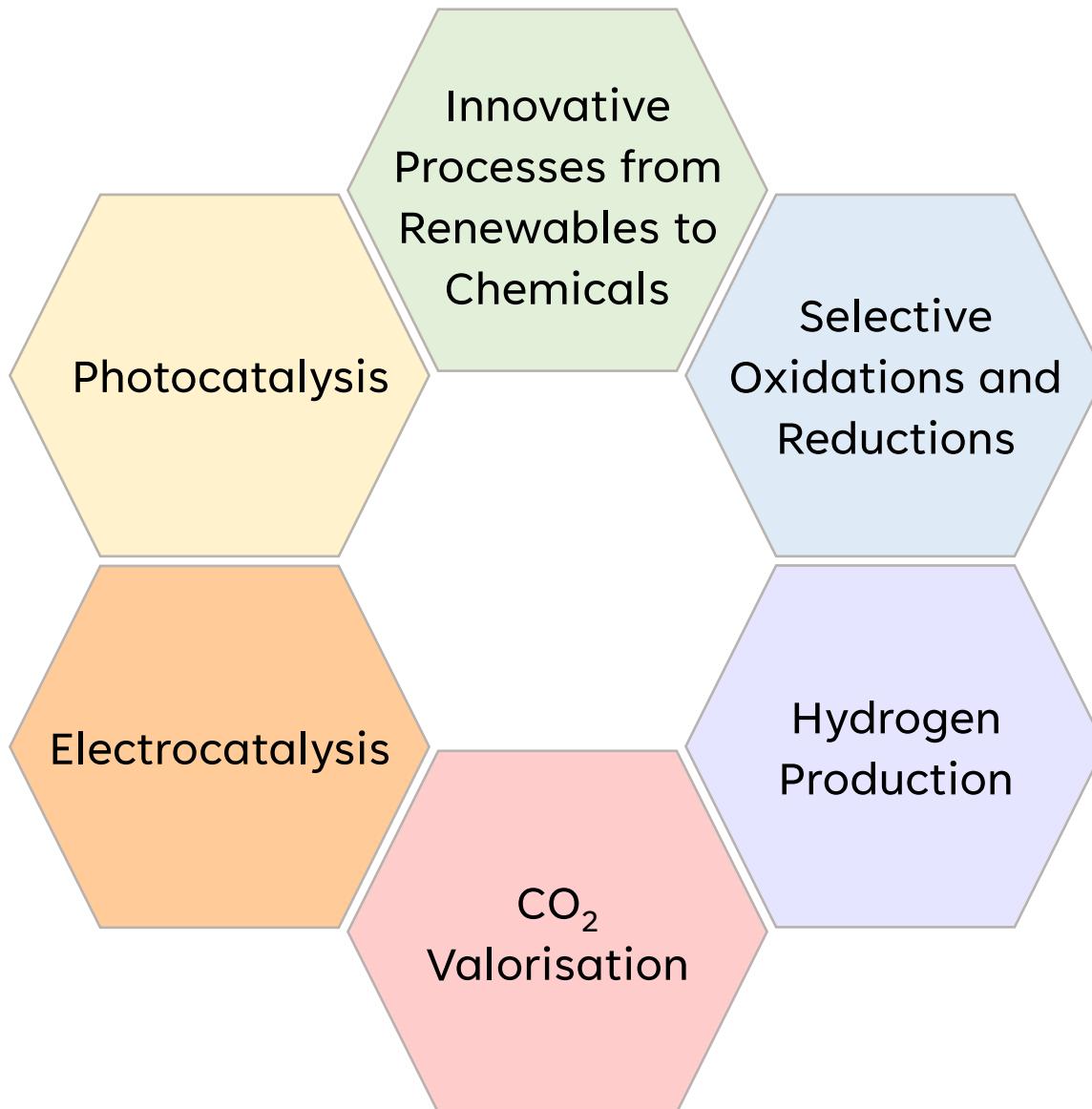
Gas Chromatography  
(GC)



High-Pressure  
Liquid Chromatography  
(HPLC)



# RESEARCH LINES



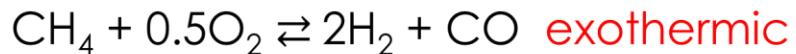
*I progetti presentati sono  
un esempio di tesi possibile  
– Vedere sul sito web dei  
singoli docenti per dettagli  
maggiore*



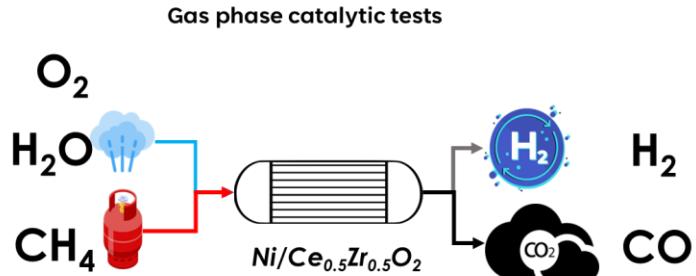
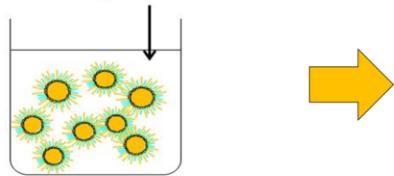
# RESEARCH LINES

## Hydrogen Production

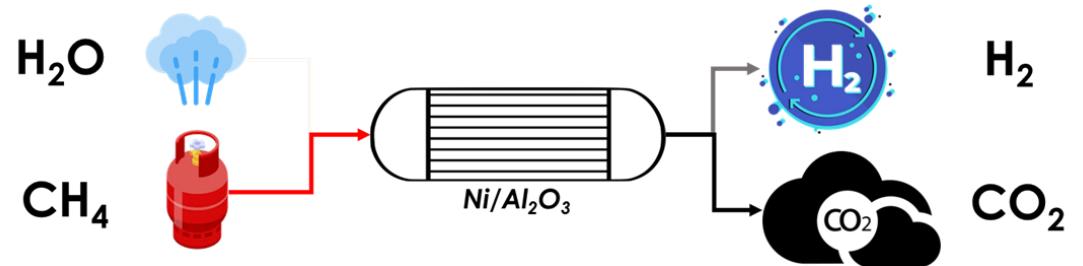
### Methane oxy Reforming



### Microemulsion synthesis of catalysts



### Methane Steam Reforming

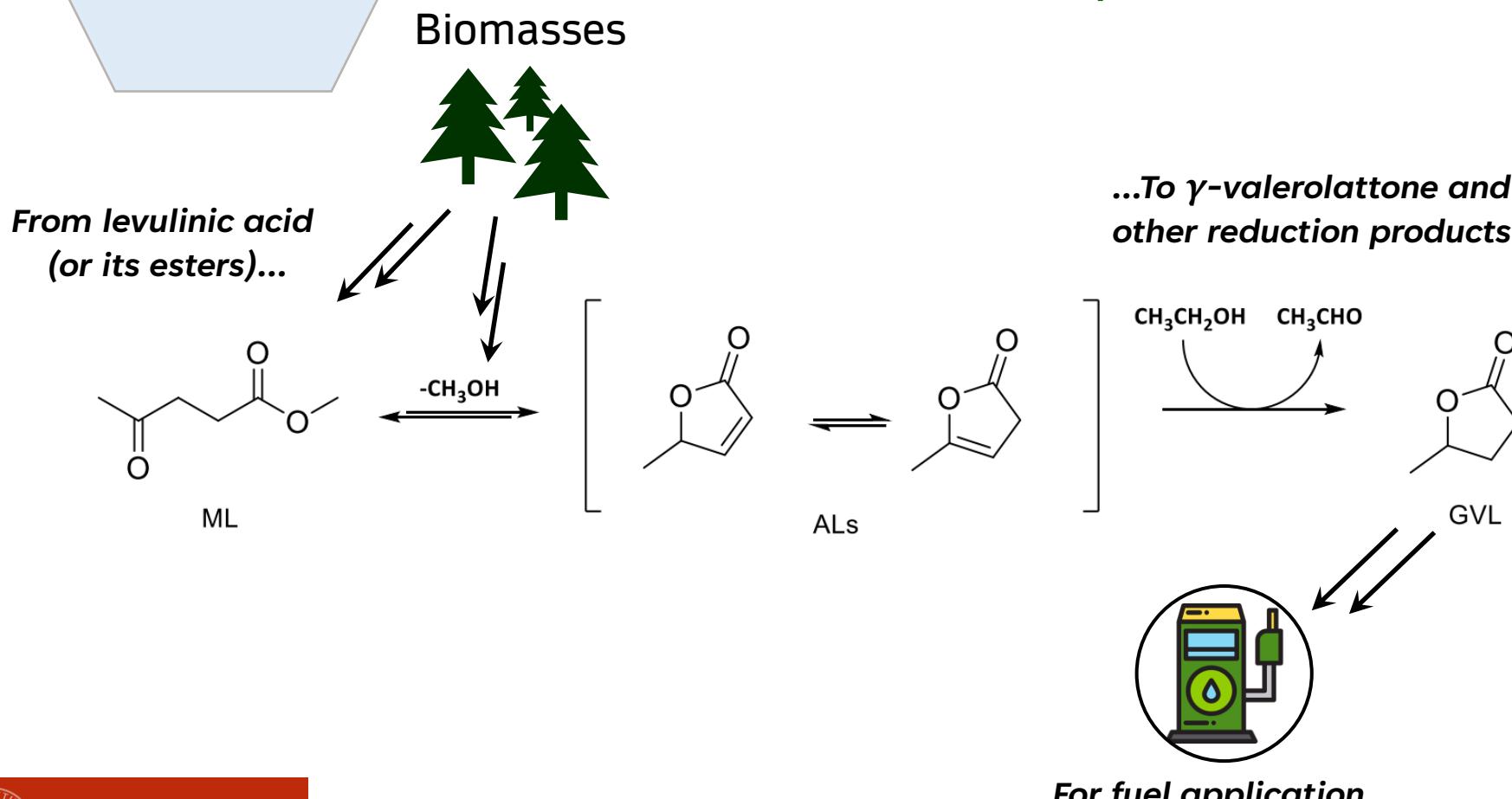


### H<sub>2</sub> production from CH<sub>4</sub> cracking (progetto Europeo Storming)



# RESEARCH LINES

Selective Reductions



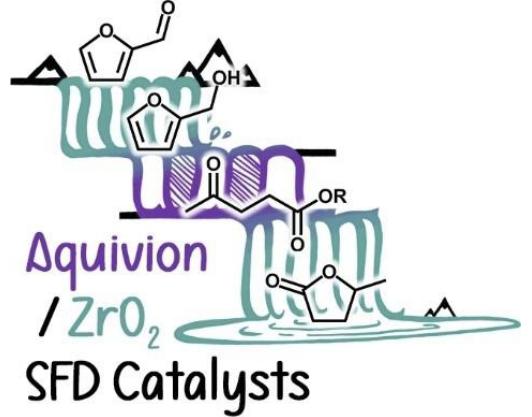
Innovative strategy: hydrogen transfer processes using bioethanol to reduce platform molecules from renewables

Continuous-flow gas phase tubular fixed bed reactor

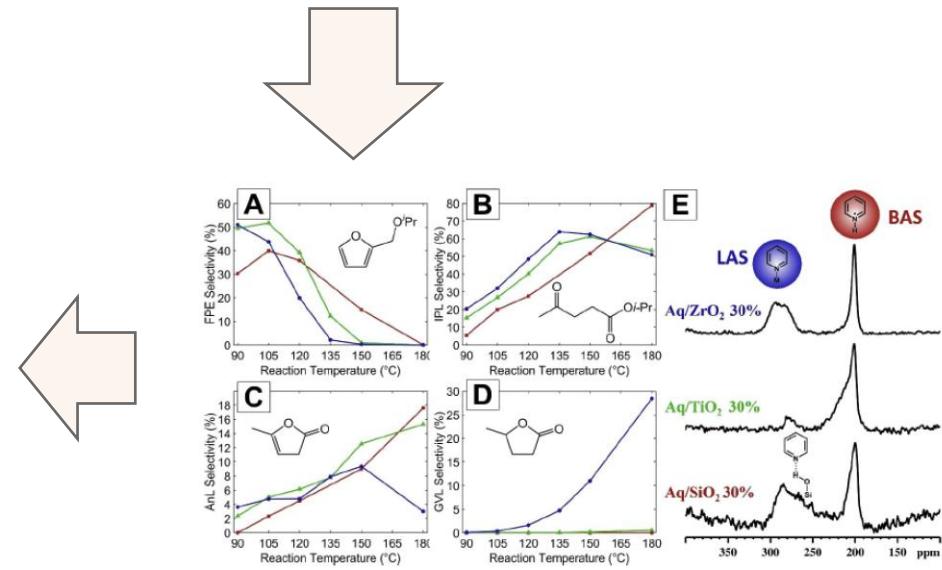
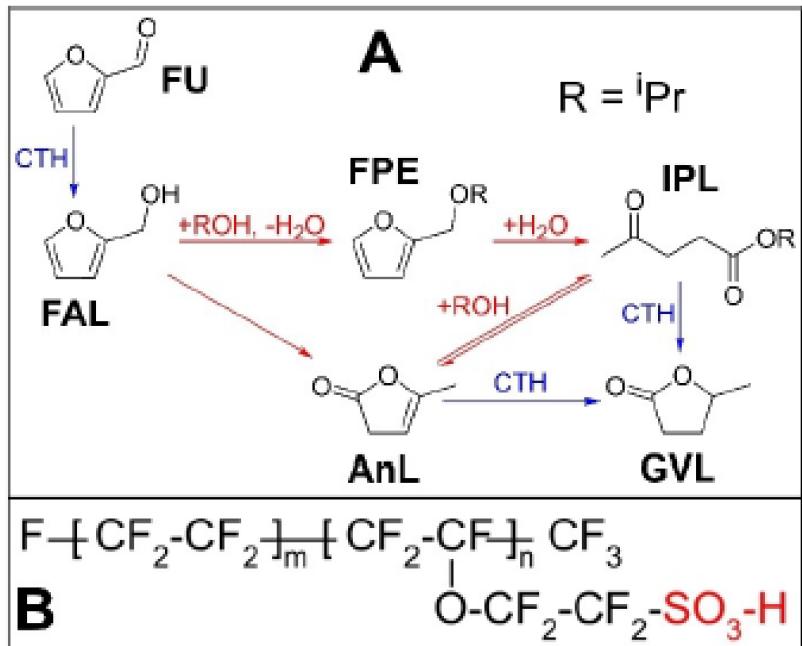
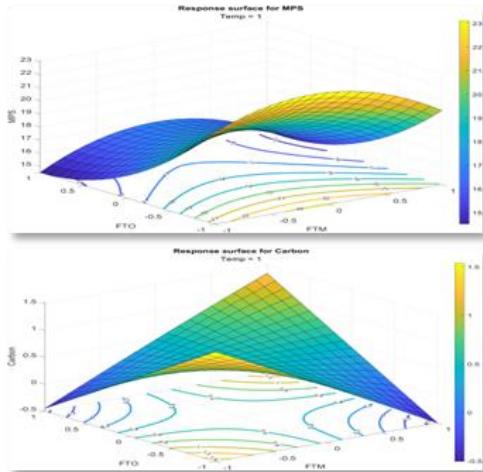
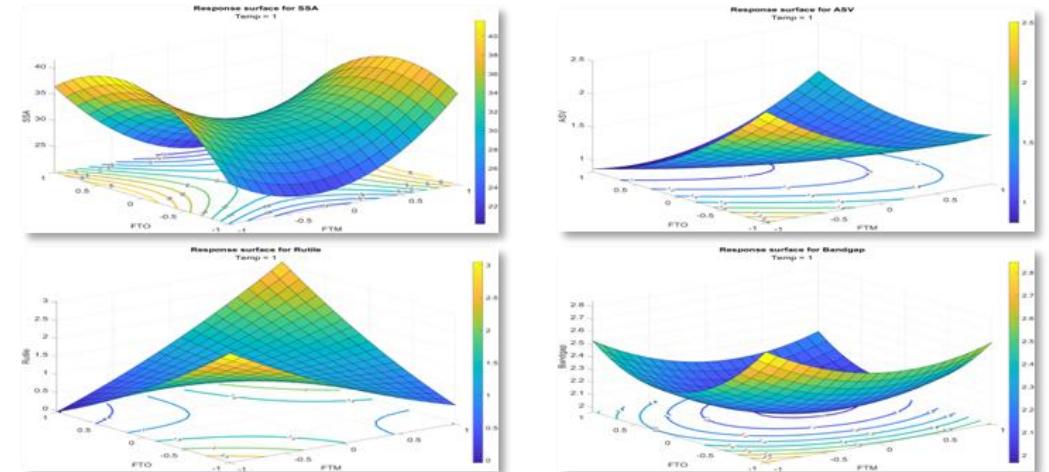


Innovative  
Processes from  
Renewables to  
Chemicals

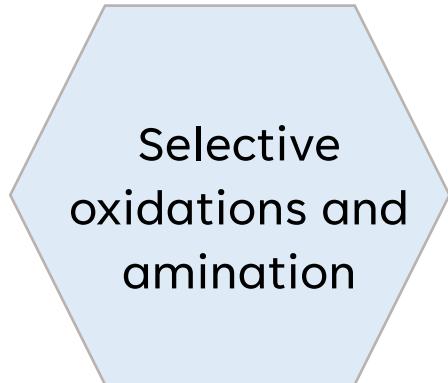
# PRODUCTION OF GVL FROM FURFURAL



DoE and IA applied to research



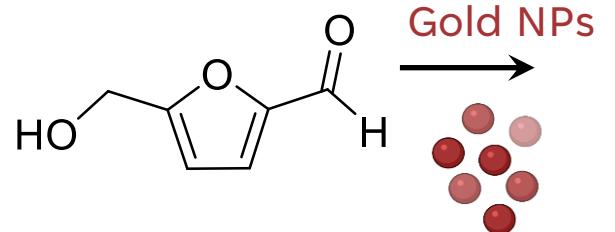
# RESEARCH LINES



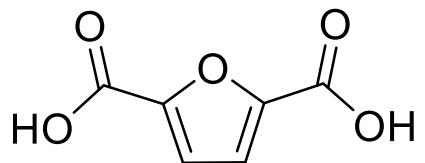
Biomasses



HMF

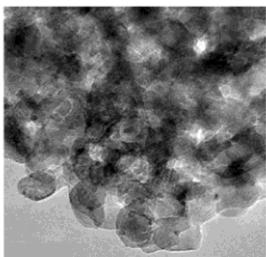
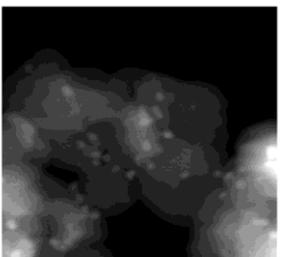
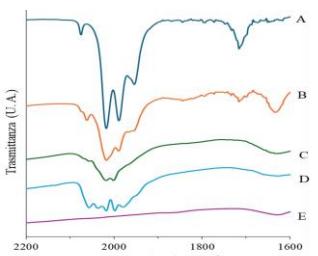
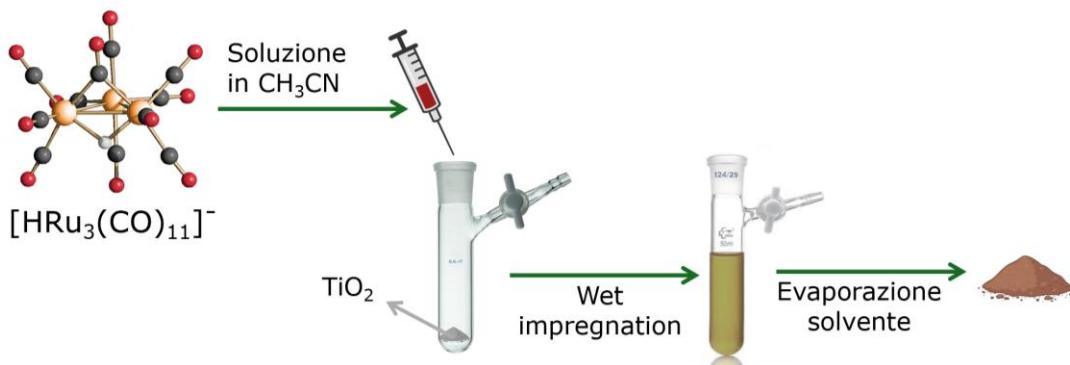
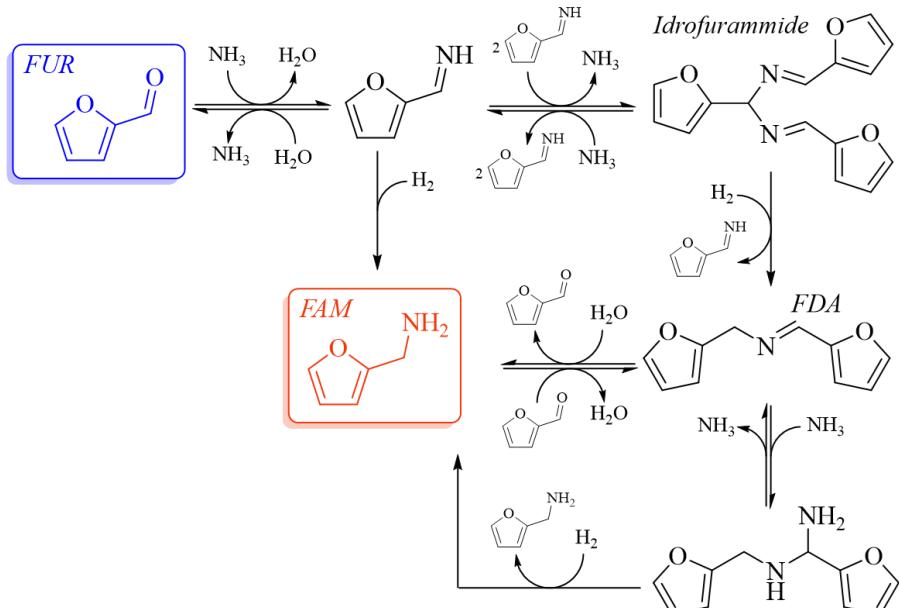


FDCA

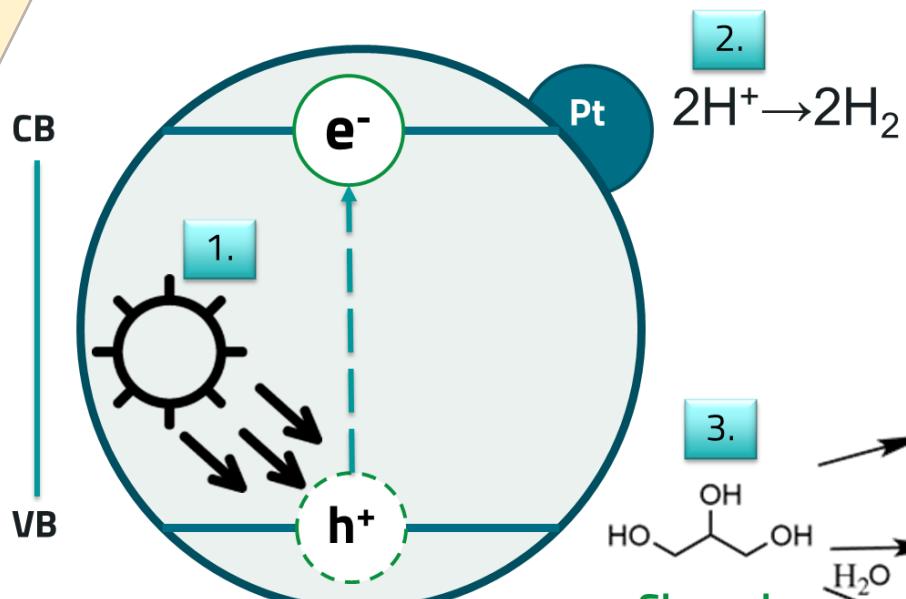
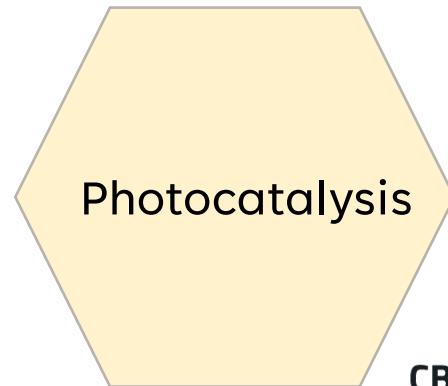


PEF

Precursor solution → Colloidal suspension → Final catalyst



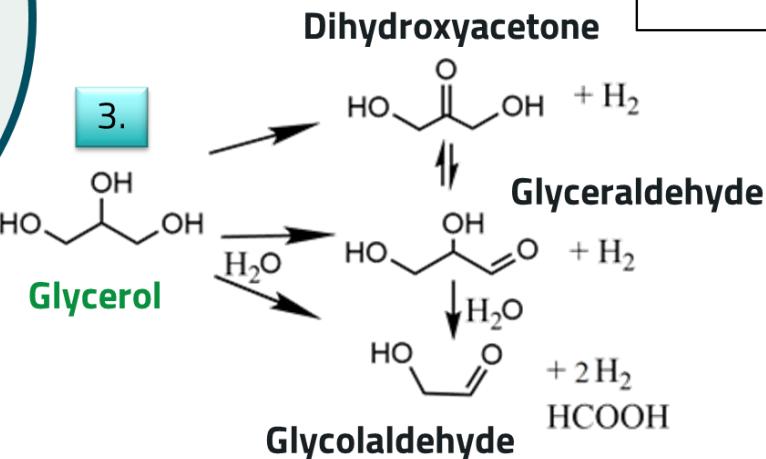
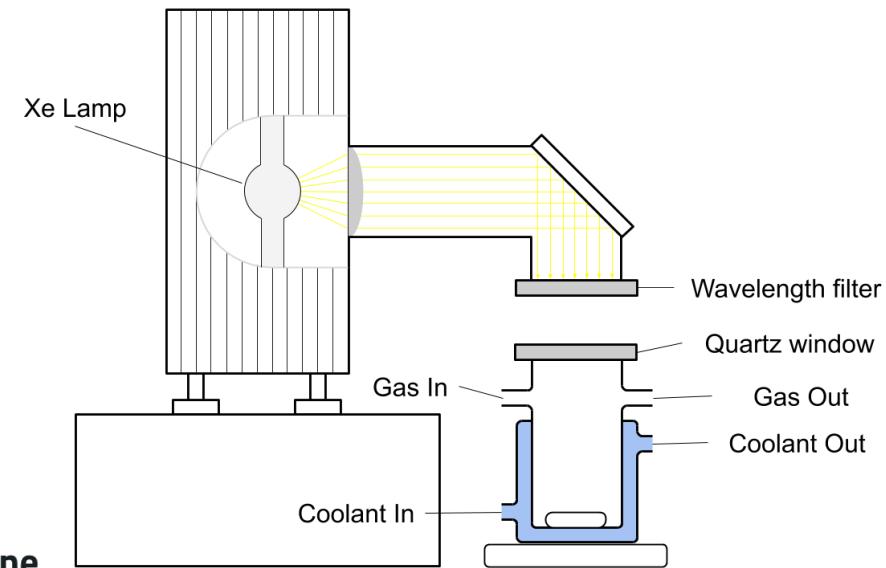
# RESEARCH LINES



1.  
Renewable  
Energy  
Source

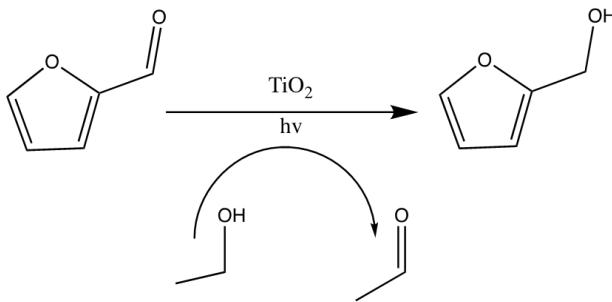
2.  
Hydrogen  
production

3.  
Valorization of  
**glycerol** towards  
production of  
chemicals

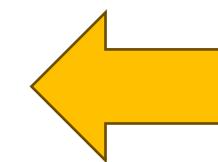
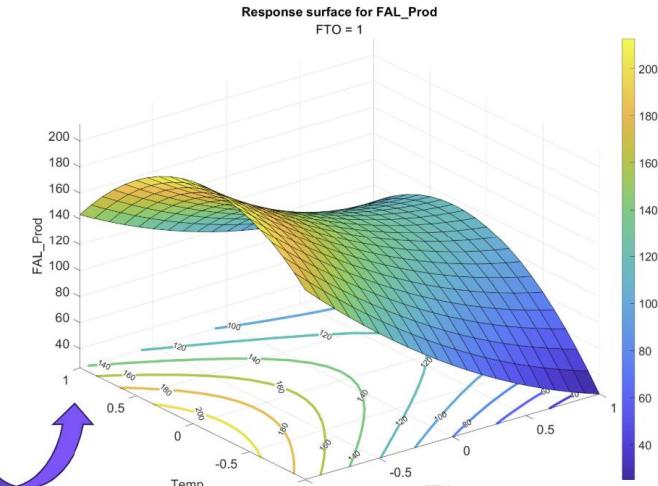
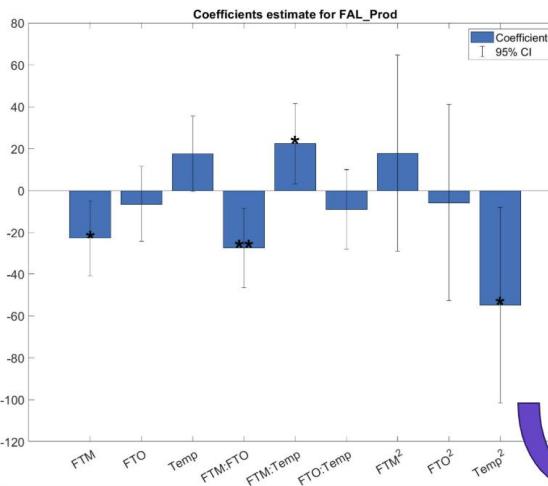


# RESEARCH LINES

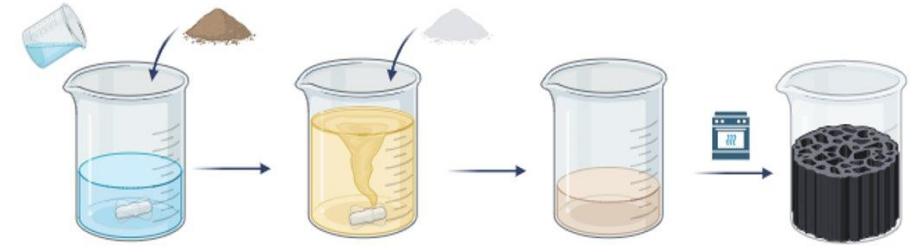
## Photocatalysis



## DoE and IA applied to research

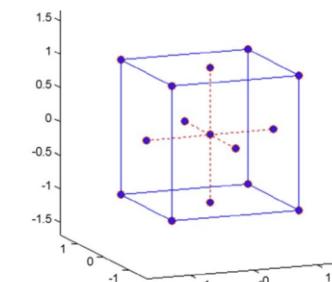


## Photocatalysis synthesis

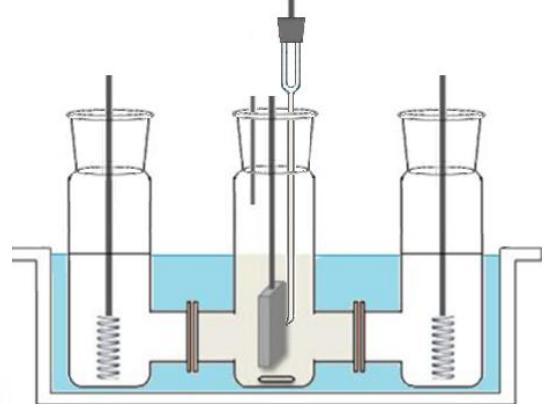
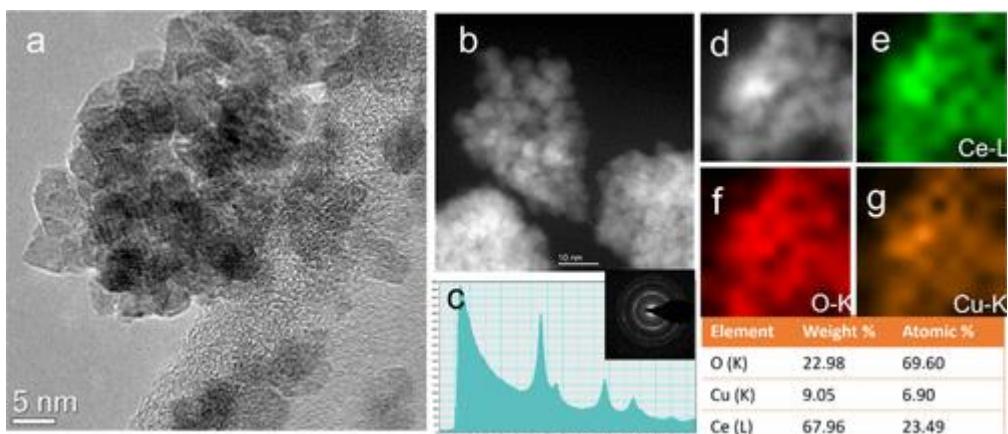
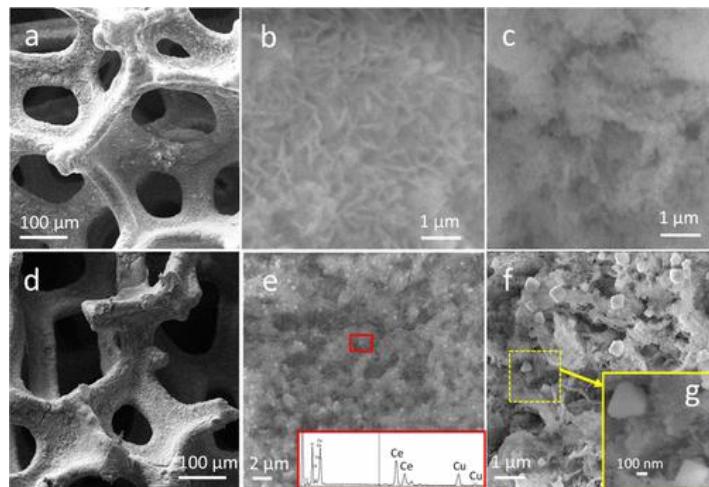
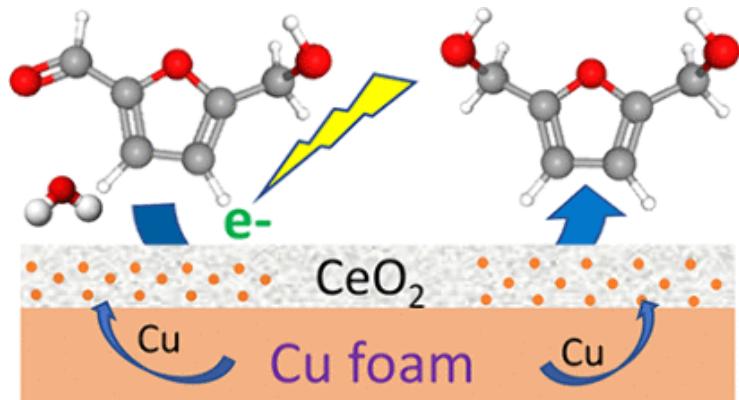
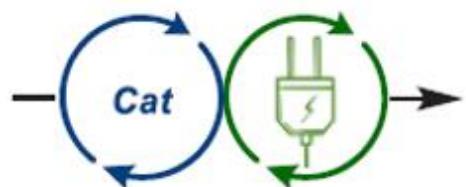
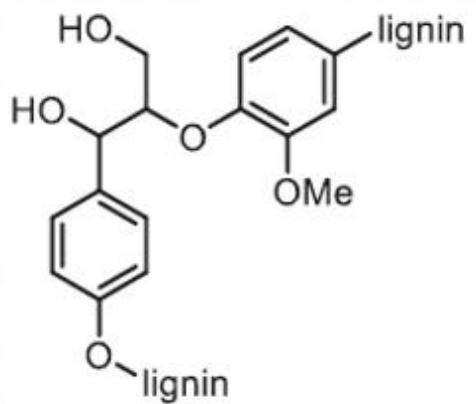
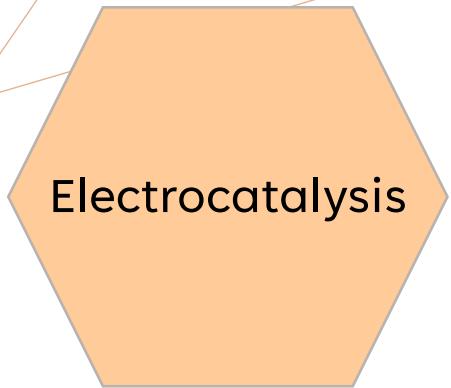


## DoE chemometric study

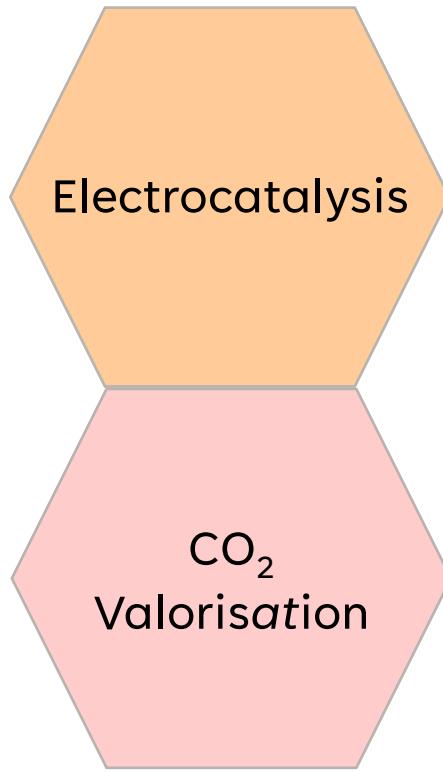
factors	-	0	+
F/M	0,4	0,8	1,2
F/O	0,5	1	1,5
T °C	400	475	550



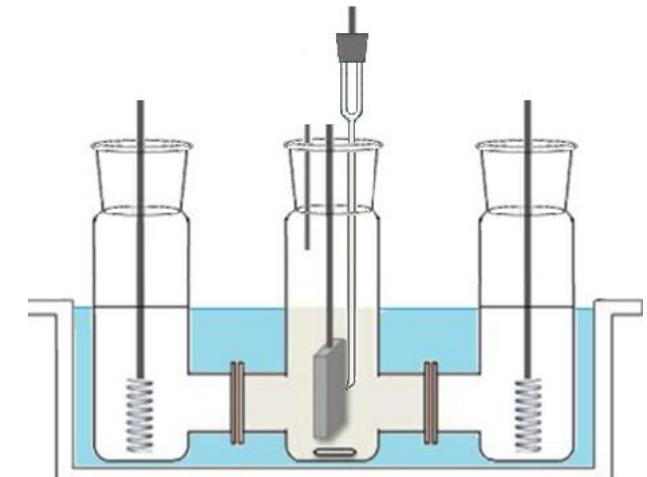
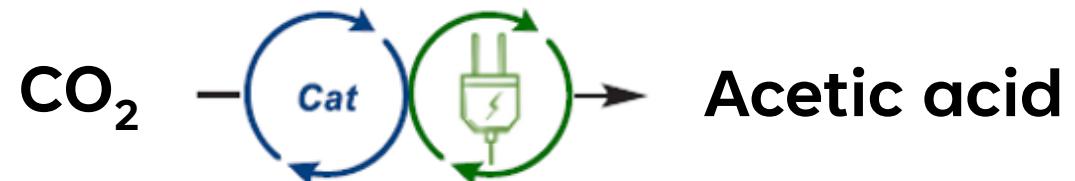
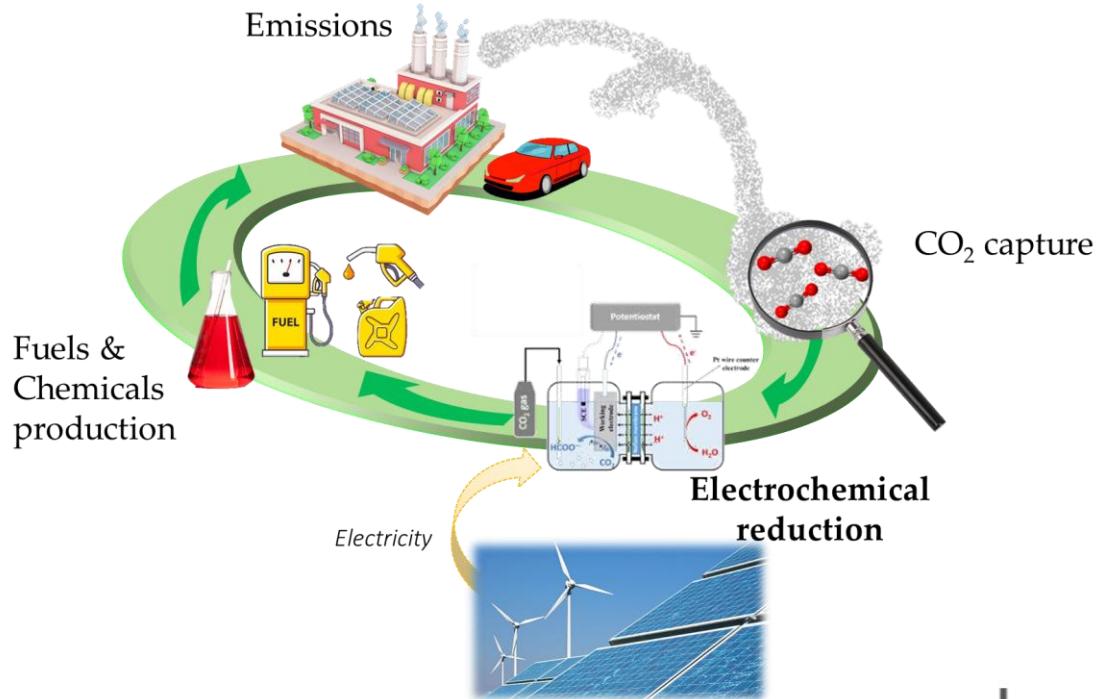
# RESEARCH LINES



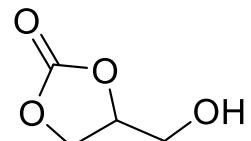
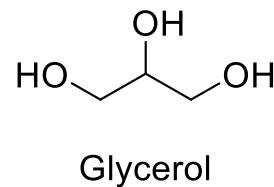
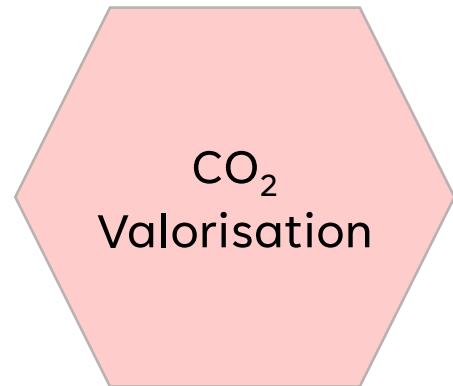
# RESEARCH LINES



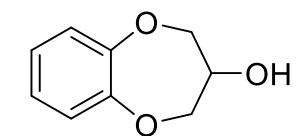
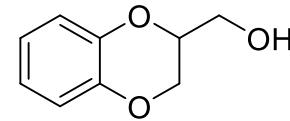
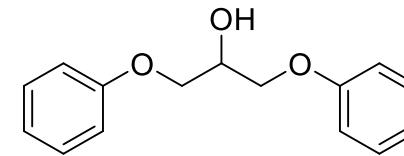
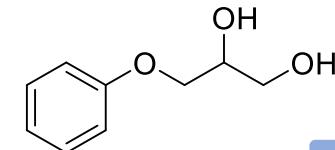
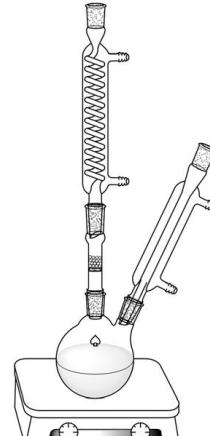
In Collaboration with the research group of Prof. Erika Scavetta



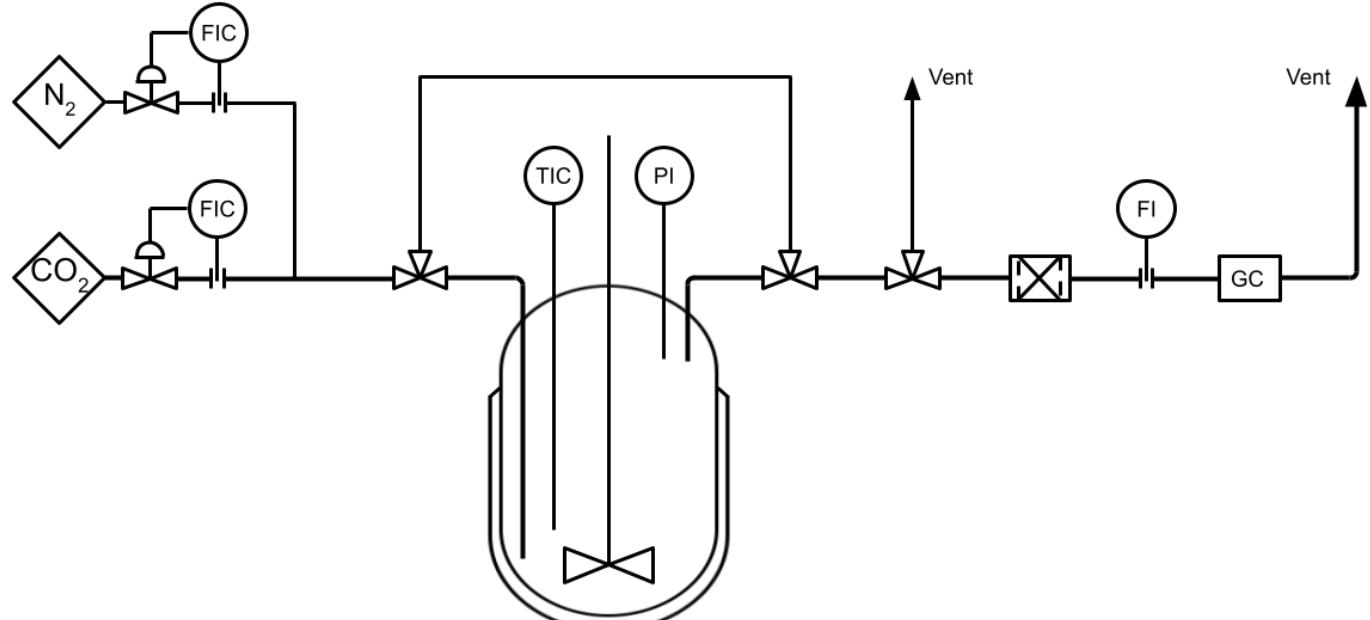
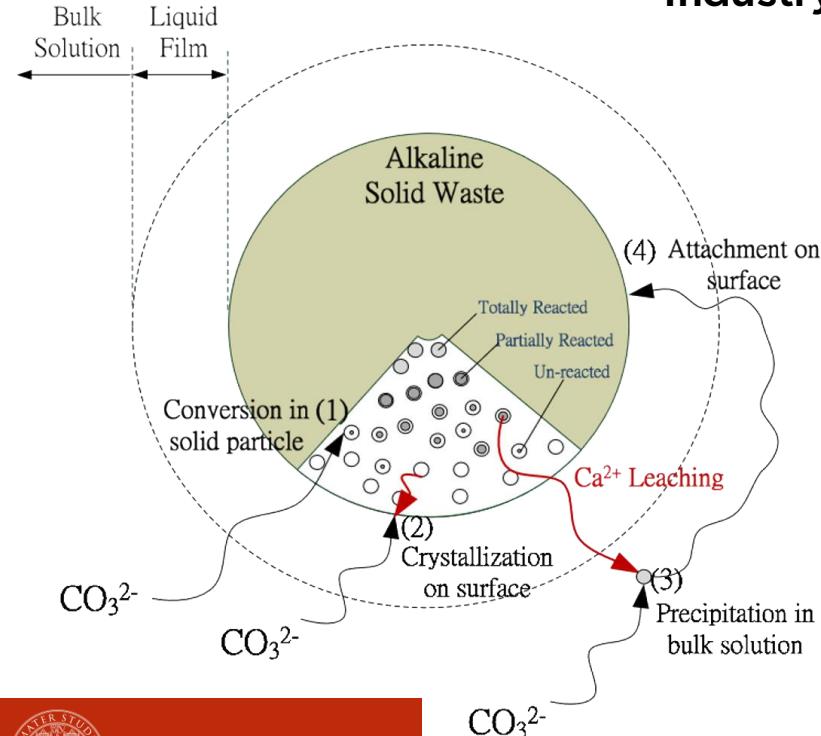
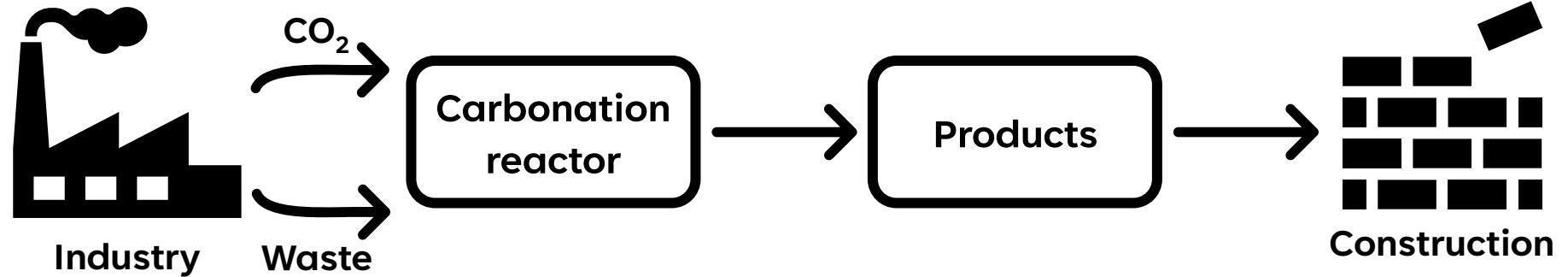
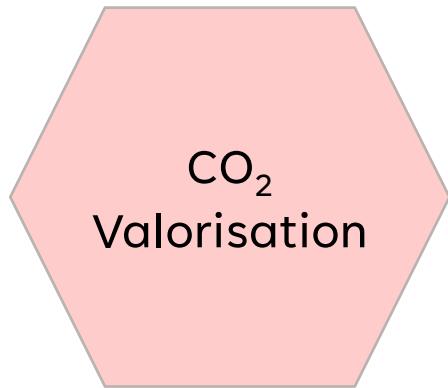
# RESEARCH LINES



Glycerol Carbonate



# Mineralization of CO<sub>2</sub> in basic waste





# CATALYSIS FOR RENEWABLES AND INNOVATIVE PROCESSES «CARE IN PROCESS»

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Prof. Nikolaos Dimitratos	<a href="mailto:nikolaos.dimitratos@unibo.it">nikolaos.dimitratos@unibo.it</a>
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Dott. Andrea Fasolini	<a href="mailto:andrea.fasolini2@unibo.it">andrea.fasolini2@unibo.it</a>
Dott. Jacopo De Maron	<a href="mailto:jacopo.demaron2@unibo.it">jacopo.demaron2@unibo.it</a>
Dott. Alessandro Allegri	<a href="mailto:alessandro.allegri2@unibo.it">alessandro.allegri2@unibo.it</a>