



MULTI-site organic-inorganic HYbrid CATalysts for MULTI-step chemical processes

Enjoy reading the MULTI2HYCAT newsletter!

MULTI2HYCAT (MULTI-site organic-inorganic HYbrid CATalysts for MULTI-step chemical processes) is a research & innovation project funded by the EU Horizon 2020 programme, coordinated by the University of Piemonte Orientale "Amedeo Avogadro". Its goal is to design, obtain proof of concept, upscale and obtain industrial validation in a pre-pilot reactor of a new class of hierarchically-porous organic-inorganic hybrid materials to be used as active catalysts in multi-step asymmetric catalytic processes.

A LOOK BACK AT THE FIRST YEAR

One year ago, the MULTI2HYCAT research and innovation project has started in developing multi-site organic-inorganic hybrid catalysts for multi-step chemical processes. The project is coordinated by the University of Piemonte Orientale "Amedeo Avogadro" and funded by the EU Horizon 2020 programme under GA no. 720783. Our overall goal is to design, obtain proof of concept, upscale and reach industrial validation of a new class of hierarchically-porous organic-inorganic hybrid materials to be used as active catalysts in multi-step asymmetric catalytic processes.

During the first year of MULTI2HYCAT, the 8 partners successively started with their specific activities to develop the hybrid materials design, to prepare the precursors, and to evaluate multi-functional organic-inorganic porous hybrid materials and supported organometallic catalysts.

THE WORK DONE SO FAR – FIRST RESULTS

To this end, a highly interdisciplinary work among the partners has been related to inorganic as well as organic chemistry, and was involving activities from physico-chemical characterization of catalysts up to the synthesis of bio-based surfactants and ligands. Moreover, computational studies were used for the optimization of the model geometry of several catalysts. The optimisation and screening of supported organocatalysts was performed, as well as the assessment of solid supports for the heterogeneization of the catalysts.

The two main research activities have been the assessment of anchored organometallic catalysts for Suzuki reactions and other Asymmetric transformations. Several synthetic routes have been explored to design and devise hybrid heterogeneous catalysts. The synthetic research activity was supported by experimental and computational physico-chemical characterization to study the surface properties of zeolites and other inorganic supports. The

development of consolidated synthetic strategies to prepare hybrid catalysts will provide new insights in this field.

Besides the technical developments, a thorough analysis took place to identify the most important stakeholders of the MULTI2HYCAT solutions and to assess their position towards the expected project's results. This stakeholder analysis was based on a comprehensive methodology, incl. identification of stakeholders who are active in the respective research the field or have registered a relevant patent.

M12 MEETING AND COMING PERIOD

At the 12-month meeting of the MULTI2HYCAT project that took place on December 21st-22nd 2017 in Barcelona (Spain), the preliminary results have been presented. Overall, in the coming period, the activities will now be focused to scale both new catalyst and new anchoring routes in order to select the most promising candidates to be synthesized on a large scale. Besides good catalytic performance, the main interest from the industrial point of view is the development of catalysts with good reusability. Moreover, mesoporous and lamellar hybrid catalysts are being developed to target specialty chemicals applications. In order to support the further development of the catalysts, the techno-economical assessment and LCA will be started.

Additionally, based on the outcome of the stakeholder analysis, more targeted dissemination and exploitation actions will be implemented and relationships will be built with key stakeholders of the project. Stakeholders that have been identified and highlighted as most relevant for the project will be invited to participate in one-to-one interviews. This approach will allow to gather also valuable market information and to receive expert feedback.

PAST EVENTS AND PUBLICATIONS

Recently, the project has been presented at several international congresses and events, incl.:

- **2nd European Conference on Metal-Organic Frameworks and Porous Polymers Conference, 29th October** – 1st November, Delft, The Netherlands <http://cheme.nl/EUROMOF2017/index.html>
- **NanoInnovation**, Conference and Exhibition, 28 September 2017, Rome, Italy
- **11th Triennial Congress of the World Association of Theoretical and Computational Chemists**, 27 August - 1 September 2017, Munich, Germany
- **EUROPACAT2017 Congress**, 27-31 August 2017 Florence, Italy <http://www.europacat2017.eu/>
- **11th European Congresses of Chemical Engineering**, 1-5 October 2017, Barcelona, Spain – in concurrence with the 10th World Congress of Chemical Engineering (WCCE 2017) and the 4th European Congress of Applied Biotechnology <http://www.wcce10.org>
- **7th International FEZA Conference**, July, 3-7, 2017, Sofia, Bulgaria <http://feza2017.org/>
- **International CECAM Workshop**, 12-16 June 2017, Bremen, Germany
- **5th International Conference on Multifunctional, Hybrid and Nanomaterials**, 06-10 March 2017, Lisbon, Portugal
- **CHESS 2017 – Conventional and high-energy spectroscopies for inorganic, organic and biomolecular surfaces and interfaces**. 27-30th November 2017, Florence, Italy

Moreover, the paper "Mesoporous silica scaffolds as precursor to drive the formation of hierarchical SAPO-34 with tunable acid properties" has been published in Chemistry – A European Journal Chem. Eur. J. 2017, 23 (41):9952-9961 <http://onlinelibrary.wiley.com/doi/10.1002/chem.201701978/abstract>

Are you interested to meet our partners? The next international events where to learn more about the project are:

- **6th International Congress on Operando Spectroscopy**, from 15-19th April 2018 in Estepona (Málaga, Spain), <http://www.operandoconference.com>
- **5th International School-Conference on Catalysis for Young Scientists "Catalyst Design: From Molecular to Industrial Level"** on 20-23rd May 2018, Moscow, Russia. <http://conf.ict.nsc.ru/catdesign2018/ru>
- **CC 2018: 20th International Conference on Catalysis** on 21-22 June 2018, Dubai, UAE, <https://www.waset.org/conference/2018/06/dubai/ICC/home>
- **18th International Symposium on Relations between Homogeneous and Heterogeneous Catalysis (ISHHC)**, 22nd to the 25th of July 2018, Sydney, Australia, <http://catalysis.org.au/events/ishhc-18>
- **7th EuCheMS Chemistry Congress**, 26-30 August 2018, Liverpool, UK, <http://www.rsc.org/events/euchems2018>
- **EFCATS School on Catalysis**, 25-29 June 2018, Liblice Castle, Czech Republic, <http://www.jh-inst.cas.cz/efcats.school/>
- **CICAT 2018, XXVI Congresso Iberoamericano de Catálise**, 9-14 September, Coimbra, Portugal, <http://cicat2018.eventos.chemistry.pt/>
- **III Encuentro de Jóvenes Investigadores de la SECAT**, 25-27 June 2018, Valencia, Spain, <https://www.secat.es/jjii/>

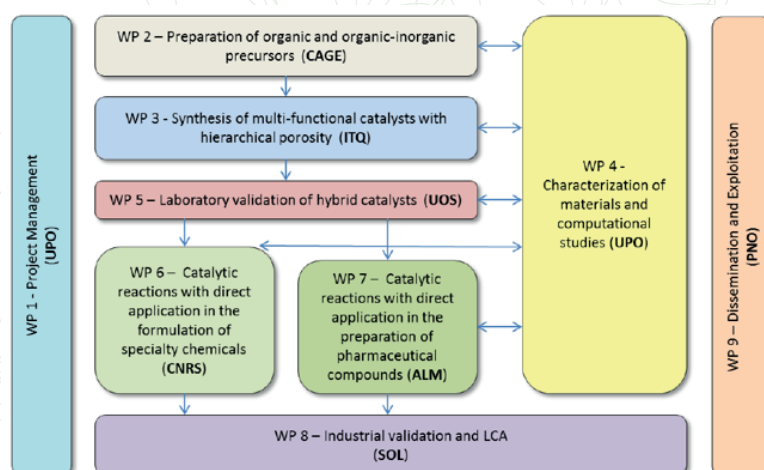
It is planned to organize a Summer School event by the ITQ inside of MULTI2HYCAT project, **Hybrid Materials for Catalytic Processes**, 5-6 July 2018, Valencia, Spain.

THE PROJECT IN BRIEF

MULTI2HYCAT stands for "MULTI-site organic-inorganic HYbrid CATalysts for MULTI-step chemical processes" and is a research & innovation project funded by the EU Horizon 2020 programme under GA no. 720783, to develop a new class of hierarchically-porous organic-inorganic hybrid materials to be used as active catalysts in multi-step asymmetric catalytic processes.

MULTI2HYCAT aims at hybrid materials design for heterogeneous catalysis. Thus, multi-step catalytic processes with high conversions and selectivities towards the desired final products may be performed for wide range of industrial applications. The new material will enable more efficient and sustainable catalytic routes and to overcome the limits of current organosiliceous solids, improving the flexibility and versatility and reducing costs of the obtained catalysts. The catalysts will be demonstrated for pharmaceutical and intermediate chemistry applications.

The MULTI2HYCAT consortium consists of 8 partners: Four research centres (UPO, ITQ, UOS and CNRS) are carrying out research activities, while three companies (the SMEs CAGE, and ALM, and the large company SOL) will validate the proposed processes and products at the industrial level. Moreover, the innovation experts from PNO will guarantee a sound dissemination campaign and the exploitation of project results.



OTHER NEWS FROM THE SECTOR

A better way to produce metal-organic frameworks

<https://phys.org/news/2017-10-metal-organic-frameworks.html>

Novel design strategy to optimize the performance of porous materials

<https://phys.org/news/2017-01-insights-metal-organic-frameworks.html>

State-of-the-art synthesis of SAPO-34 zeolites catalysts for methanol-to-olefin conversion

https://www.eurekalert.org/pub_releases/2017-09/scp-ss092017.php

COF on MOF: A New Type of Hybrid Material

<http://www.advancedsciencenews.com/cof-mof-new-type-hybrid-material/>

An efficient approach of conjugated tetraenes from butadiene and alkynes

<https://www.sciencedaily.com/releases/2018/01/180115094228.htm>

Copper will replace toxic palladium and expensive platinum in the synthesis of medications

https://eurekalert.org/pub_releases/2017-12/ufu-cwr120517.php

Isostructural phosphonate metal-organic frameworks with controlled Lewis acidity and chemical stability for asymmetric catalysis

<https://www.nature.com/articles/s41467-017-02335-0>

KEEP INFORMED

If you want to learn more about the MULTI2HYCAT project, please visit MULTI2HYCAT website at www.multi2hycat.eu or follow the project on Twitter and LinkedIn.

To get in touch with one of the MULTI2HYCAT partners, please e-mail info@multi2hycat.eu

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For more info about the project visit the MULTI2HYCAT website at: www.multi2hycat.eu  **MULTI2HYCAT**



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