



**CRITICAL RAW MATERIAL ELECTROCATALYSTS REPLACEMENT
ENABLING DESIGNED POST-2020 PEMFC**

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Start date: 01.01.2018 –Duration: 36 months

Project Coordinator: Deborah Jones –CNRS

DELIVERABLE REPORT

DELIVERABLE 7.3 – Dissemination and Communication bundle comprising a package of visual identity tools and project brochure, 2 publications in international journals, 4 conference presentations, 2 annual newsletters

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Author (s)	N. Cros
Workpackage	WP7
Workpackage Leader	PXO
Lead Beneficiary	PXO
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DISSEMINATION LEVEL

PU	Public	X
PP	Restricted to other programme participants (including the Commission Services)	
RE	Restricted to a group specified by the consortium (including the Commission Services)	
CO	Confidential, only for members of the consortium (including the Commission Services)	

NATURE OF THE DELIVERABLE

R	Report	X
P	Prototype	
D	Demonstrator	
O	Other	

SUMMARY	
Keywords	Dissemination and Communication
Abstract	During the first 24 months of the CRESCENDO project the consortium undertook various dissemination and communication measures. Target groups include industry, academia, government bodies and the public.
Public abstract	<i>Same as above</i>

REVISIONS			
Version	Date	Changed by	Comments
0.1	27 January 2020	PXO	
0.2	27 January 2020	CNRS	

DISSEMINATION AND COMMUNICATION BUNDLE COMPRISING A PACKAGE OF VISUAL IDENTITY TOOLS AND PROJECT BROCHURE, 2 PUBLICATIONS IN INTERNATIONAL JOURNALS, 4 CONFERENCE PRESENTATIONS, 2 ANNUAL NEWSLETTERS

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1. INTRODUCTION

Since the start of the CRESCENDO project, the consortium has been engaged in conducting activities for promoting and disseminating the project results. The measures undertaken are detailed below.

It is important to highlight that each communication or dissemination of results generated by CRESCENDO must first receive the agreement of the partners to protect the intellectual property rights, confidentiality and legitimate interests according to the Grant Agreement Article II.30. A dissemination protocol was agreed by the Project Steering Committee. In summary, a draft of the intended publication, conference abstract or conference presentation is made available to all partners, who have four weeks in which to comment. If an objection is raised, partners work together to see how the document may best be modified to avoid divulgence of confidential or patentable information. Details of this protocol are provided in the deliverable report D7.2.

2. DISSEMINATION & COMMUNICATION ACTIVITIES DURING THE FIRST 24 MONTHS OF CRESCENDO

2.1. VISUAL IDENTITY TOOLS

- Logo



A CRESCENDO logo was designed to clearly identify the project. It is used in all dissemination or communication supports for the project. It is available to all partners on the Project Shared Workspace (PSW).

- Presentation template

A CRESCENDO presentation template, including the project and FCH-JU and EC logos, was prepared, distributed to partners, and is available on the PSW for use for project presentations at project meetings, and for conference presentations.

2.2. BROCHURE, NEWSLETTER AND POSTER

To assist communication different types of communication supports were designed and edited in agreement with all the consortium. These communication supports are available from the public website.

Furthermore, to increase their availability and efficiency, they were also printed and distributed to the partners for their use during attendance at conference and technical fair events.

- Project brochure: To assist communication from CRESCENDO, a project brochure was edited, printed and distributed to partners for their use when attending conference and technical fair events. This brochure is also available from the public website ([Brochure PDF to download](#)).
- A newsletter was released and included main achievements on catalyst benchmarking, *ex situ* electrochemical characterisation of PGM-free catalysts, and integration of bio nickel complexes in anode catalyst layer. The printed newsletter will be distributed conference attendances and specifically to all the EFCD2019 participants and spread using each partner LinkedIn account. It is also available on the public website ([Newsletter issue#1 PDF to download](#)).
- Poster: a poster presented the project was prepared and already presented during a workshop. It can be used by partners when needed and is available on the PSW and on the public website.

3. DISSEMINATION OF PROJECT RESULTS

3.1. CONFERENCE PRESENTATIONS

CRESCENDO partners have disseminated project results at conferences through oral and poster presentations including:

- **International Society of Electrochemistry Annual Meeting, Durban, South Africa, 4-9 August 2019**
 - CNRS, TUB, ICL, UNIPD, JMFC joined presentation: *Increased Understanding of non-PGM Catalysts for PEMFC Cathodes*
- **Electrochemical Conference on Energy and the Environment: Bioelectrochemistry and Energy Storage, July 21-26, 2019, Glasgow, Scotland**
 - CNRS invited presentation: *Iron-nitrogen moieties embedded in a carbon matrix as bio-inspired electrocatalytic sites for dioxygen electroreduction in fuel cells*
 - CEA presentation: *Noble metal free molecular based anode for H₂-O₂ fuel cell*
- **EFCD2019, 15-18 September 2019, La Grande Motte, France**
 - TUB poster presentations:
 - *Influence of carbon support modification on non-noble MNC catalyst for oxygen reduction reaction*
 - *Confined Pyrolysis Synthesis of Fe-Coordinated Nitrogen-Doped Carbon Catalysts with Surface-Rich Fe-N_x Moiety to Boost the Oxygen Reduction Reaction in Acidic Media*
 - TUB invited presentation: *PGM-poor and PGM-free ORR fuel cell electrocatalysts*
 - UNIPD oral and poster presentations:
 - *What core@shell model studies can teach us about electrocatalysis?*
 - *Converting mixed plastics into mesoporous Fe-N-C electrocatalyst active for oxygen reduction*
 - *Reaction in acidic electrolyte: the continuing challenge of active site formation and characterization*
 - ICL oral presentation: *Increasing population of oxygen reduction active sites in Fe-N/C catalysts*
 - CEA poster presentation: *Non-covalent integration of a Ni based molecular catalyst to graphene acid for efficient, noble-metal free, electrocatalytic H₂ oxidation*
 - CNRS overview presentation of CRESCENDO
 - CNRS poster presentations:
 - *Atomically Dispersed Iron Nitrogen Carbon Catalysts with High Turnover Frequency for Oxygen Reduction Reaction in PEM Fuel Cells*
 - *Effect of Pyrolysis Atmosphere and Electrolyte pH on the Oxygen Reduction Activity, Stability and Spectroscopic Signature of FeN_x Moieties in Fe-N-C Catalysts*
 - *Non-PGM metal-based Catalysts Based on MOFs and Electrospun Carbon Nanofibers*
 - *Platinum Free Cathode: Development of a Chemically Regenerative Redox Fuel Cell*
 - *Engineering the 3D architecture of non-precious metal cathodes for practical H₂/air proton exchange membrane fuel cell applications*
 - *Activity-stability relation for iridium oxide nanoparticles deposited on doped tin oxide nanofibres as oxygen evolution catalysts for PEM water electrolysis*
 - *Development of bipolar membrane electrode assemblies for fuel cell and water electrolysis*
 - *Novel ORR electrocatalyst based on Pt-RE nanoparticles supported on nitrogen functionalised porous carbon*
- **235th ECS meeting, 26-30 May 2019, Dallas, USA**
 - CNRS poster presentation: *Chemically Regenerative Redox Fuel Cell As Alternative to Conventional Proton Exchange Membrane Fuel Cell*
- **25th Topical Meeting of the International Society of Electrochemistry, New electrochemical processes for energy, and the environment 12-15 May 2019, Toledo, Spain**
 - University of Padova oral presentation: *Converting mixed plastics into mesoporous Fe-N-C electrocatalyst for energy devices*
 - University of Padova poster presentation: *Effect of different iron precursors on catalytic performance of Fe-N-C Catalysts for ORR PEMFC*

- **FCH JU PEMFC development workshop, 5-6 March 2019, Marseille, France**
 - All partners poster presentation: CRESCENDO - Critical Raw material Electro-catalystS replacement Enabling Designed pOst-2020 PEMFC
- **Electrochemical Discussions - Latest insights on PGM-free catalysts for Energy systems and Fuel Cells, 8th Feb. 2019 Turin, Italy**
 - CNRS, TUB, ICL, UNIPD, JMFC poster presentation: Identification of the Site Density and Turnover Frequency of Fe-N-C Catalysts and of PEMFC Performance Limitations of Fe-N-C Catalyst Layers.
 - ICL oral presentation: Counting active sites and estimating turnover rates in Fe-C/N catalysts.
- **Groupe Français de Bioélectrochimie - GFB 2018, 24-27 September 2018, Sète, France**
 - CEA presentation: Noble metal free molecular based anode for H₂-O₂ fuel cell
- **ISE meeting, Bologna, 3-5 September 2018, Italy**
 - UNIPD poster presentations:
 - Influence of Iron Complex Precursor on the Active Site Density in Fe-N-C Catalysts for ORR in PEMFC
 - Soft Template Synthesis of Fe-N-C Catalysts for ORR from Fe-Chelating Polymers
 - UNIPD oral presentation
 - Highly Graphitized Fe-Nitrogen Doped Carbon Derived from Biomass as Electrocatalyst for Oxygen Reduction Reaction

3.2. PUBLICATIONS

ACCEPTED

- **CS Appl. Mater. Interfaces 2020, Noncovalent Integration of a Bioinspired Ni Catalyst to Graphene Acid for Reversible Electrocatalytic Hydrogen Oxidation**, B. Reuillard, M. Blanco, L. Calvillo, N. Coutard, A. Ghedjatti P. Chenevier, S. Agnoli, M. Otyepka, G. Granozzi, V. Artero
 DOI: <https://doi.org/10.1021/acscami.9b18922>
- **ACS Catalysis 2019 9 (10), 9359-9371, Understanding Active Sites in Pyrolyzed Fe-N-C Catalysts for Fuel Cell Cathodes by Bridging Density Functional Theory Calculations and 57Fe Mössbauer Spectroscopy**, T. Mineva, I. Matanovic, P. Atanassov, M.-T. Sougrati, L. Stievano, M. Clémancey, A. Kochem, J.-M. Latour, and F. Jaouen
 DOI: <https://www.researchgate.net/deref/http%3A%2F%2Fdx.doi.org%2F10.1021%2Facsatal.9b02586>
- **ACS Catal. 2019, 9, 4841-4852, Accurate Evaluation of Active-Site Density (SD) and Turnover, Frequency (TOF) of PGM-Free Metal-Nitrogen-Doped Carbon (MNC) Electrocatalysts using CO Cryo Adsorption**, F. Luo, C. Hyuck Choi, M. J.M. Primbs, W. Ju, S. Li, N. D. Leonard, A. Thomas, F. Jaouen, and P. Strasser
 DOI: <https://www.researchgate.net/deref/http%3A%2F%2Fdx.doi.org%2F10.1021%2Facsatal.9b00588>
- **Johnson Matthey Technology Review, Volume 62, Number 2, 1 April 2018, pp. 231-255(25), Toward Platinum Group Metal-Free Catalysts for Hydrogen/Air Proton-Exchange Membrane Fuel Cells**, Jaouen, F.; Jones, D.; Coutard, N.; Artero, V.; Strasser, P.; Kucernak, A.
 DOI: <https://www.researchgate.net/deref/http%3A%2F%2Fdx.doi.org%2F10.1595%2F205651318X696828>

SUBMITTED

- **Nature Materials, Identification of durable and non-durable FeNx sites in Fe-N-C materials for proton exchange membrane fuel cells**, J. Li, M. Tahar Sougrati, A. Zitolo, J M. Ablett, I. Can Oğuz, T., Mineva, I. Matanovic, P. Atanassov, A. Di Cicco, K. Kumar, L. Dubau, F. Maillard and F. Jaouen
- **Unraveling the Origin of Catalytic Oxygen Reduction Reactivity of Precious Group Metal (PGM)-free Fe-N-C Benchmark Catalysts for PEM Fuel Cells**, M. Primbs, Y. Sun, A. Roy, M.-T. Sougrati, P.-Y. Blanchard, G. Granozzi, V. Perazzolo, P. Atanassov, J. Sharman, C. Durante, A. Kucernak, D. Jones, F. Jaouen, P. Strasser

3.3. CONFERENCE ORGANISATION

Organisation of an international conference - EFCD2019: Electrolysis and Fuel Cell Discussions - Towards Catalysts Free of Critical Raw Materials for Fuel Cells and Electrolysers

The joint CRESCENDO-CREATE conference, Electrolysis and Fuel Cell Discussions - Towards catalysts free of Critical Raw Materials for fuel cell – EFCD2019 was held in La Grande Motte, France from 15-18 September 2019. This conference brought forward deliverable D7.4 by several months.

- The conference website was released in July 2018: www.efcd2019.eu
- A flyer announcing the event was edited and distributed during various conferences.
- 125 abstracts were received, and the programme of the conference included 34 oral presentations, 11 keynote lectures and 84 posters.

4. CONCLUSION AND FUTURE WORKS

With regards to the deliverable's objectives, the project consortium has finalised all planned communication and dissemination actions and exceeded the targets for WP7 in the first 24 months.

Within the next months, the CRESCENDO partners will continue collectively to monitor all the dissemination and communication measures and evaluate them using internal feedback at each progress meeting. Partners will report on communication activities carried out or planned, using indicators including number of relevant events attended, of project flyers distributed, conference papers presented, and press release / media articles published and their impact on the project visibility.