Hong Phong DUONG

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SUMMARY

In collaboration with TotalEnergies, my PhD and postdoctoral research focus on **copper-based materials** for $CO_{(2)}$ conversion employed in a **flow-cell and membrane assembly electrode electrolyzers** operating at industrially relevant conditions for CO_2 and CO conversion. I succeeded to achieve various highly active electro-catalysts for the conversion of CO_2 and CO to essential chemicals including ethylene, ethanol and n-propanol. My expertise includes gaseous and liquid products quantification by GC-FID(TCD) and NMR methods, electrochemical analyses, nano-materials syntheses, material characterizations including XPS, XRD, SEM, TEM, EDX, EXAFS. During my master's study, I had developed a new spray-drying synthesis and surface modification by noble metal to achieve 2 highly active photo-catalysts for hydrogen production as a green energy carrier from water splitting reaction.

RESEARCH EXPERIENCES

2024-Present	**Postdoc** in collaboration with *TotalEnergies,* Collège de France, France.
2021–2023	**PhD**, Electroatalysis and Chemical Engineering in collaboration with *TotalEnergies*, Collège de France and Sorbonne University, France. *Supervisors: Prof. Marc Fontecave and Dr. Ngoc-Huan Tran.*
2020	**Research Associate**, Electrocatalysis in collaboration with *Sumitomo Metal Mining*, Institute of Multidisciplinary Research for Advanced Materials, Tohoku University, Japan.
2017–2019	**Master by research**, Photocatalysis and Chemical Engineering, Tohoku University, Japan. *Supervisors: Prof. Masato Kakihana and Prof. Hideki Kato.*
2016	**Intern**, International Center for Materials Nanoarchitectonics, National Institute for Materials Science (NIMS), Japan. *Supervisor: Prof. Gaulthier Rydzek.*

PATENTS

2. M.W. Schreiber, **H. P. Duong**, N.H.Tran, M. Fontecave, *"Highly efficient copper nitridebimetallic catalysts for electrochemical reduction of one or more carbon oxides to n-propanol and/or ethanol",* No.PCT/EP2023/079651, Application date: 24/10/2022.

1. M.W. Schreiber, **H. P. Duong**, N.H.Tran, M. Fontecave, *"Electrochemical carbon oxides reduction to ethylene"*, US12188138B1.

SCIENTIFIC PUBLICATIONS **5 first-authored, 3 co-authored (1 under revision)**

8. **H. P. Duong**, J. G. Rivera de la Cruz, D. Portehault, A. Zitolo, J. Louis, S. Zanna, Q. Arnoux, M.W. Schreiber, N. Menguy, N.H.Tran, M. Fontecave, *"Incorporation of isolated Ag atoms and Au nanoparticles in copper nitride for selective CO electroreduction to multicarbon alcohols"*, *Nat. Mater., 24, 900 (2025)*.

7. A. Ghoridi, CV. M. Inocêncio, **H.P. Duong**, N.H. Tran, I. Gómez-Recio, M L R. Gonzàlez, S. Steinmann, P. Verma, A. Miche, S. Casale, C. Gervais, C.C Diogo, I. Génois, A. Zitolo, C. Sahle, A. Longo, J.M González-Calbet, M. Fontecave, D. Portehault, *"Tuning covalence for phosphorus-mediated C-C coupling in carbonmonoxide electroreduction to multicarbon oxygenates"*, *Under review*.

6. **H. P. Duong,** N.H.Tran, P-A. Deyris, Y-M. Lergrand, P. Hesemann, C. Grison, CM. Grison M. Fontecave, *"Electrocatalytic reduction of carbon dioxide using Cu-based ecocatalysts"*, *Chem.Commun., 61, 7514 (2025)*.

5. **H. P. Duong**, J. G. Rivera de la Cruz, N.H.Tran, J. Louis, S. Zanna, D. Portehault, A. Zitolo, M. Walls, D.V. Peron, M.W. Schreiber, N. Menguy, M. Fontecave, *"Silver and Copper Nitride Cooperate for CO Electroreduction to Propanol"*, *Angewandte Chemie, 62, e202310788 (2023).*

4. **H.P. Duong**, N.H. Tran, G. Rousse, S. Zanna, M.W. Schreiber, M. Fontecave, *"Highly selective copper-based catalysts for electrochemical conversion of carbon monoxide to ethylene using a gas-fed flow electrolyzer"*, *ACS Catal., 12, 10285 (2022).*

3. N.H. Tran, **H.P. Duong**, G. Rousse, S. Zanna, M.W. Schreiber, M. Fontecave, *"Selective ethylene production from CO_2 and CO reduction via engineering membrane electrode assembly with porous dendritic copper oxide"*, *ACS Appl. Mater. Interfaces, 14, 31933 (2022).*

2. D.N. Minh, **H.P. Duong**, L. Hoang, N.D. Phuc, P.D. Tran, P.N. Hong, *"Plasma-assisted preparation of MoS_2/graphene/MOF hybrid materials and their electrochemical behaviours"*, *Materials Transactions, 61, 1535 (2020)*.

1. **H.P. Duong**, T. Mashiyama, M. Kobayashi, A. Iwase, A. Kudo, Y. Asakura, S. Yin, M. Kakihana, H. Kato, *"Z-scheme water splitting by microspherical Rh-doped $SrTiO_3$ photocatalysts prepared by a spray drying method"*, *Applied Catalysis B: Environmental, 252, 222 (2019)*.

CONFERENCE PRESENTATIONS **8 talks (1 invited), 7 posters**

Oral

09/2025 76th Annual Meeting of the International Society of Electrochemistry, Mainz, Germany
"Advancing C_{2+} alcohols synthesis from electrochemical CO reduction by a gold-silver incorporated with copper-nitride material"

07/2025 Invited talk at P2X HUB Webinar, Bangkok, Thailand
"Copper-based Electrocatalysts for CO_2 Valorization at Industrially Relevant Conditions"

06/2024 8èmes journées du GDR Solar Fuels, Grenoble, France
"Improving synthesis of n-propanol from CO reduction by Ag-Cu_3N electrocatalyst"

03/2023 3rd MOMENTOM International Congress, Saclay, France
"Selective electrochemical reduction of CO to n-propanol and ethanol by nitride-derived bimetallic catalysts".

11/2022 6èmes journées du GDR Solar Fuels, Fréjus, France
"Highly efficient dendritic copper and nitride-derived bimetallic electrocatalysts CO reduction to multicarbon products".

01/2019 The 57th Symposium on Basic Science of Ceramics, Sendai, Japan
"Synthesis of well-dispersive highly active Rh-doped $SrTiO_3$ photocatalyst by spray drying method".

09/2018 The 122nd Catalysis Society of Japan Meeting, Hakodate, Japan
"Modification of Rh-doped $SrTiO_3$ with two kinds of cocatalyst for improvements of Z-schematic overall water splitting".

03/2018 The 98th Chemical Society of Japan Annual Meeting, Funabashi, Japan
"Influences of synthetic methods of Rh-doped $SrTiO_3$ on Z-schematic overall water splitting".

Poster

03/2025 4th MOMENTOM International Congress, Saclay, France
"Copper-based electro-catalysts for sustainable chemical production from carbon oxides conversion.

05/2022 Renewable Energy: Solar Fuels-Gordon Research Conference, Barga, Italy
"Dendritic copper catalyst combined with alkaline flow cell reactor as a highly efficient system for electrochemical CO reduction to ethylene".

11/2019 International Conference on Materials and Systems for Sustainability, Nagoya, Japan
"Improvement of Activity of Rh-doped $SrTiO_3$ Photocatalyst Aiming at Enhancement of Efficiency of Z-scheme Water Splitting".

09/2019 The 124th Catalysis Society of Japan Meeting, Nagasaki, Japan
"Improvement of activities of Z-scheme systems composed of $SrTiO_3$:Rh and $BiVO_4$ by deposition of two kinds of cocatalyst on $SrTiO_3$:Rh".

05/2019 TU-USTB Joint Symposium, Sendai, Japan
"Preparation of microspherical Rh-doped $SrTiO_3$ photocatalysts by a spray drying method and its application in Z-scheme water splitting".

11/2017 2017 Ceramic Society of Japan Tohoku-Hokkaido Branch Symposium, Sendai, Japan
"Synthesis of $SrTiO_3$:Rh by a spray dry method employing a water-soluble titanium complex".

09/2017 The 120th Catalysis Society of Japan meeting, Matsuyama, Japan
"Study on improvement of efficiencies of Z-scheme systems employing $SrTiO_3$:Rh and $BiVO_4$".