

Siglinda Perathoner

CURRICULUM VITAE (Aug. 23)

PERSONAL INFO



ACTUAL POSITION

DEGREE

SHORT SUMMARY

Siglinda PERATHONER

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Full Professor in Industrial Chemistry (CHIM/04) at the University of Messina

Doctorate in Chemical Sciences (obtained in 1988 at the University of Bologna)

Siglinda PERATHONER earned her PhD in Chemical Sciences in 1988, working on the photophysics and photochemistry of supramolecular systems with V. Balzani and the Nobel Prize J.M. Lehn. She joined the University of Messina in 2001 and is currently a full professor of Industrial Chemistry.

She has coordinated many European projects and is currently the coordinator of the OCEAN European project on new industrial electrocatalytic pathways for CO₂ conversion leading to the realisation of a demo unit. She has been active for over 30 years in the field of catalysis and is the author of about 400 publications, several in the top 1%, and over 500 communications at international conferences. She is a co-editor of several books or special issues of international catalysis journals. Additionally, she is a co-author of numerous highly cited papers in international journals and has been the chair of several international conferences, workshops and symposiums on catalysis.

She is the editor of the Wiley VCH book "Sustainable Industrial Chemistry", the Wiley & Sons book "Green Carbon Dioxide: Advances in CO₂ Utilisation" and the Elsevier book "Horizons in Sustainable Industrial Chemistry and Catalysis". She has contributed to various encyclopedias, including "Reduction of greenhouse gas emissions by catalytic processes" in the Handbook of Climate Change Mitigation and "Artificial Leaves" in the Kirk-Othmer Encyclopedia of Chemical Technology. She co-chaired Europacat 2017, an important event in the Catalysis community, and was chair of several other conferences.

The current h-index is 80 (50 from 2018), with over 26,000 citations (Google Scholar Aug 23) and i10-index 297. Among the prizes and recognitions were the Special Award in 2008 from "The Altran Foundation for Innovation" for the project on the development of artificial leaves for the conversion of CO₂; the participation in 2011 in the film "NanoInLife" produced by the European Commission to show the results of nanotechnologies to the public; the Mario Giacomo Levi Medal of the Italian Chemical Society of 2021 for the innovative activity that led to industrial achievements, and in 2021 the President's International Fellowship Initiative (PIFI) of the CAS (Chinese Academy of Visiting Scientists).

Her research interests include nanostructured oxides and nanocarbons for catalytic applications, particularly in the photo and electrocatalytic sector, using solar energy to convert CO₂, H₂O and N₂.

ww2new.unime.it/catalysis

EDUCATION AND CAREER

1984	Degree in Chemistry at the University of Bologna (prof. V. Balzani)
1985-1988	PhD in Chemical Sciences at the University of Bologna (prof. V. Balzani)
1989-1996	Post-doctoral contract and research grants, Univ. of Bologna, Italy
1999-2001	Post-doctoral contract and research grants, Univ. of Messina, Italy
2001-2003	Researcher (Industrial Chemistry), Univ. Messina
2003-2018	Associate Prof. (Industrial Chemistry), Univ. Messina
2018-today	Full Professor (Industrial Chemistry), Univ. Messina
2016- today	Coord. Laboratory of Catalysis and Sustainable Production and Energy (CASPE), reference INSTM
2019- today	UniME Delegate in the Board of Directors of the INSTM Materials Science and Techn. Consortium
2021- today	Member of the National Commission for Scientific Evaluation 03 / C2
2021- today	Coordinator of the Sustainability and Environmental Innovation (SIA) degree course, class L-27

The doctorate was in collaboration with the Nobel laureate J.M. Lehn (various joint publications). She was the coordinator of EU projects CAT-MED (ICA3-2002-10096), ELCAT (FP6-2003-NEST-A / 2400), INCAS (NMP2-LA-2010-245988), OCEAN (SPIRE 10-2017) and principal scientific investigator (PI) of numerous European projects for UdR Univ. Messina, including coordinated action EU CONCORDE (nanostructured oxides) and EU NATAMA project (FP6-2004-NMP-32583, Nano-designed thin films for materials applications advanced). The ELCAT project is one of the ten projects selected by the EU Commissions in the first call of the NEST area (among the more than 200 presented in all fields of science) as "new frontiers of research that can produce a significant breakthrough for science".

RESEARCH & QUALIFICATION

Recent plenaries and invited readings (selection)

2022-21

- Bridging nanoscience and electrocatalysis to design advanced electrodes, 44th Int Conference on Coord. Chem., Au. 28th- Sept. 2th, 2022, Rimini, Italy. Invited
- Electrocatalysis: facing the challenge of extending its use to go beyond fossil fuels, Europacat 2021, Prague, Czech Rep., 29/08-3/09 2021, keynote (postponed 2023)
- EU GREEN WEEK 2021 PARTNER EVENT "Towards Zero Pollution in the Production of Green Fuels and Chemicals" June 4th 2021
- Italian Chemical Society (SCI), SCI2021, 23th Sept. 21, keynote.

2020

- SINCHEM Winter School 2020, Feb 4-6, 2020 Bologna, Italy; plenary lecture

2019

- First International Bunsen-Discussion-Meeting on Fundamentals and Applications of (Photo) Electrolysis for Efficient Energy Storage, April 1 – 5, 2019 in Taormina, Italy; invited lecture
- Summer School "Making Business with new technologies within green chemistry & sustainable energy), plenary

2018

- SGI-SIMP Conference (Geosciences for the environment, natural hazard and cultural heritage), Catania (Italy), 12-14 Sept. 2018, invited
- CARBOCAT VIII - 8th International Symposium on Carbon for Catalysis, Porto (Portugal), 26th-29th June 2018, keynote
- 2018 BIST (Barcellona Institute of Science and Technology) Conference, June 27th, 2018, Barcellona (Spain), invited (The energy re-evolution: To be clean or not to be)
- Science Academy - Bologna Institute, 50th Years of Heterogeneous Catal., 22 June 2018, Bologna (Italy), invited

2017

- Ernst Haage Symposium, November 22-24 2017, Mülheim - Germany, plenary
- Workshop on CO₂, Univ. Malaya (Kuala Lumpur, Malesia), 20 July 2017, plenary
- CIS-7 (7th Czech-Italian-Spanish Symposium on Catalysis), June 13-17th 2017, Trest (Czech Rep.), plenary
- Workshop on Science & Techn Innov for Brasil, UNESP Araraquara (Brasil), March, 9-10th, 2017, plenary
- Univ. of Malaya, Nanocat Lecturship, 19th Jan 2017, Kuala Lumpur (Malesia), plenary

2016

- Workshop on "Next Generation Energy Storage Technologies: Challenges and Opportunities", 2-3rd December 2015, Taormina, Italy, New approaches to recycle CO₂ and reduce emissions, invited
- NANOTECHITALY 2015 (Sect.: Bio-Inspired and Bio-Based Technologies), Bologna, Nov. 25 – 27th, 2015, Artificial photosynthetic leaves: their role for sustainable future, invited
- Third International Conference on Catalysis for renewable sources: fuel, energy, chemicals (CRS-3), Catania, , September 6 - 11, 2015, Integrating bio - and solar refineries: an effective new option, plenary

Awards and recognitions

- 2006: EU ELCAT project (coord. S. Perathoner): selected among EU success stories, one of the eight projects selected in the entire energy sector
- 2008: "Altran Foundation for Innovation", special award for the project on the development of artificial trees for the conversion of CO₂
- 2010: finalist of the European Sustainable Chemistry Award 2010 (EuCheMS)
- 2011: "NanoInLife", a film produced by the European Commission to show the public the results of nanotechnologies; interview with S. Perathoner and presentation of the results on CO₂ (one of the 10 examples selected in the EU from the entire nanotechnology sector)
- 2021: Mario Giacomo Levi Medal of the Italian Chemical Society, jointly with G. Iaquaniello (NextChem) for the innovative activity carried out in the field of Chemistry that led to industrial implementation.
- 2021: CAS (Chinese Academy of Sciences) President's International Fellowship Initiative, PIFI (Visiting Scientists)

Academia

- 2009-11: Member of the Board of the Italian Zeolite Association
- 2012: 14: Member of the Board of the interdivisional group of catalysis of the Italian Chemical Society
- 2022-25: Member of the Board of the Industrial Chemistry Division of the Italian Chemical Society

Visiting professor

- 2015-17: Academic Icon (Univ. Malaya, Kuala Lumpur, Malaysia)

International Activities

- UNIME Head of the European Doctorate SINCHEM (Sustainable Industrial Chemistry),
- UNIME manager of various international collaborations, including the Univ. Malaya (Kuala Lumpur, Malaysia) and the University of Queensland (Australia)
- collaboration (as evidenced by joint publications in the last 5 years) with over 10 research centres and companies around the world
- visiting professor Univ. Malaya (Malaysia) in the years 2015-2017
- tutor numerous PhD students with international tutors (5)
- a member of the international evaluation panel (Committee for the appointment of the director, Max Planck Institute for Chemical Energy Conversion, Germany)
- a member of the selection committee of international research projects (CE, ANR - France, EU)
- a member of the ICIQ candidate selection and evaluation committee (Tarragona, Spain)
- a member of the evaluation and selection committee Director ICIQ (Tarragona, Spain)

Chairperson

- President of international conferences: 14 in the years 1999-2017
- Conferences invited, years 2010-2017: 17 plenaries, 6 keynotes, 12 guests

Selection of organized international conferences

- 8th European Workshop on Selective Oxidation (Turku, Finland, 9-30 Aug. 2007). Chairpersons: F.Cavani, V.C. Corberan, G Centi, G. Mestl, S. PERATHONER, P. Ruiz
- Catalysis for a Sustainable Chemistry: Walking to the Frontiers between Homogeneous and Heterogeneous Catalysis, Messina, May 4th, 2009. Chairperson: S. PERATHONER
- CIS-3/AIZ-2009 3rd Czech-Italian-Spanish Trilateral Meeting on catalysis and Micro/Meso-Porous Materials and IX National Conference on Science and Technology of Zeolites, 21-25th June, 2009, Acireale (CT). Chairpersons: S. PERATHONER, S. Quartieri
- 5th International Symposium on Carbon for Catalysis - Carbocat-V, June, 28th 30th, 2012 - Bressanone/Brixen. Chairpersons: C. Milone, L. Prati, S. PERATHONER
- 6th IDECAT/ERIC-JCAT Conference on Catalysis, Design advanced multifunctional catalysts for sustainable processes, 3-6th March 2013, Bressanone/Brixen. Chairpersons: S. PERATHONER, A. Jentys, C. Claver.
- XVII National Congress of Catalysis GIC 2013 and XI National Congress of Zeolites Science and Technology, 15 - 18 September 2013, Riccione, scientific committee
- XVIII Scuola Nazionale di Scienza e Tecnologia dei Materiali - Ischia 16-20 Luglio 2014, scientific committee
- 6th Czech-Italian-Spanish Conference on Molecular Sieves and Catalysis joint with GIC 2015

Congress (XVIII National Congress of Catalysis) and AIZ 2015 Congress (XII National Congress of Zeolites Science and Technology), 14th to 17th June, 2015, Amantea (CS), Italy. Chairpersons: G. Giordano, S. PERATHONER, L. Marchese.

- Europacat 2017, 13th European Congress on Catalysis, August 27 to 31, 2017 in Florence, Italy. Chairpersons: Gabriele CENTI, Rinaldo PSARO, Giorgio STRUKUL and Siglinda PERATHONER
- XIII Italian Congress of Zeolites Science and Technology (AIZ2017), 1-2 September 2017, Florence, Italy. Chairpersons: Siglinda Perathoner, Girolamo Giordano
- 4th Euro Asia Zeolite Congress (4th EAZC), 27th to 30th January 2019 in Taormina (ME), Italy . Chairpersons: Siglinda Perathoner, Girolamo Giordano, S.B. Hong
- Chair organization XXII Congress of the Division of Industrial Chemistry of the Italian Chemical Society, Catania, 7-8th Nov. 2022

COORDINATION & SCIENTIFIC RESPONSABILITY

National projects

NATIONAL COORDINATOR

- PRIN 2017: CO₂ as only source of carbons for monomers and polymers: a step forwards circular economy (CO₂ ONLY), national scientific coordinator

RESPONSABLE SCIENTIFIC PRINCIPAL INVESTIGATOR (PI)

- PRIN 2003: Materiali multifunzionali nanostrutturati con migliorata attività fotocatalitica. 24th months, Scientific responsible for UniME
- PRIN 2007: Sustainable 2nd generation H₂ production processes from renewable sources, 24th months, Scientific responsible for UniME
- PRIN 2010: CO₂ activation mechanisms for the design of new materials for energy and resource efficiency , 36th months, Scientific responsible for UniME
- PON01_01725: New Photovoltaic Technologies for Intelligent Systems Integrated in Buildings (Photovoltaic), 36th months from 1st Oct 2011, Scientific responsible for UdR UniME
- PON02_00355_3416798. ENERGETIC: Technologies for ENERGY and Energy Efficiency , 36th months from 1st Jan 2012, Scientific responsible for UdR UniME
- INSTM/ Lombardia Region 2013: Lanthanum ferrites for new energy sources (Ferriti-NFE), 24th months, Scientific responsible for UdR ME of INSTM

EU Projects

PROJECT COORDINATOR

- FP6-2003-NEST-A: Electrocatalytic Gas-Phase Conversion of CO₂ in Confined Catalysts (ELCAT), 42th months, Coordinator of the project
- FP5-ICA3-2002-10096 Novel Catalytic Technologies for the treatment of wastewater from Agro-food and industrial productions in MED Countries, 36th months, Coordinator of the project
- FP7-NMP2-LA-2010-245988 Integration of Nanoreactor and multisite CAtalysis for Sustainable chemical production (INCAS), 48th months, Coordinator of the project
- H2020-767798: Oxalic acid from CO₂ using Electrochemistry At demonstratiON scale (OCEAN), on-going, 48th months, Coordinator of the project

RESPONSABLE SCIENTIFIC PRINCIPAL INVESTIGATOR ((PI) FOR UDR UNIME

- FP6-2002-NMP-1: Coordination of Nanostructured Catalytic Oxides Research and Development in Europe (CONCORDE), 27th months, scientific responsible for UdR UniME
- FP6-2004-NMP-32583 Nano-engineered thin films for advanced materials applications (NATAMA), 36th months, Scientific responsible for UdR ME
- FP7-2012- 309701: Eco-friendly biorefinery fine chemicals from CO₂ photo-catalytic reduction (ECO2CO₂), 36th months, Scientific responsible for UdR ME
- FP7-2014- 621210 (FCH JU). Integrated High-Temperature Electrolysis and Methanation for Effective Power to Gas Conversion (HELMETH), 36th months, Scientific responsible UdR ME
- 532475-1-IT-2012-1-ERA MUNDUS-EMJD Erasmus Mundus Joint Doctorate Programmes "Sustainable INdustrial CHEMistry", 96th months, Scientific responsible for UdR ME
- IAPP CONTRACT 324292-2013. BIOFUR: BIOpolymers and BIOfuels from FURan based building blocks. A Marie Curie Industry-Academia Partnerships and Pathways, 36th months, Scientific responsible for UdR ME
- FETPROACT-2016, An Artificial Leaf: a photo-electro-catalytic cell from earth-abundant materials for sustainable solar production of CO₂-based chemicals and fuels (A-LEAF) "Project ID: 732840, scientific responsible for UdR ME
- H2020-NMBP-ST-IND-2018-2020, PowerPlatform: Establishment of platform infrastructure for highly selective electrochemical conversions (PERFORM), project 820723, Scientific responsible UdR ME

Industrial projects

- Project with ALTA, 1 year (2010)
- Project with Toyota, 2 year (2011-2012)

Monographs and Encyclopaedia (last 10 years)

- 2021 G. Centi, S. Perathoner, Handbook of Climate Change Mitigation and Adaptation. Springer. (Entry 1: Catalytic Technologies for the Conversion and Reuse of CO₂, 50 pages; DOI: 10.1007/978-1-4614-6431-0_119-1; Entry 2: Reduction of non-CO₂ Greenhouse Gas Emissions by Catalytic Processes, 44 pages, DOI: 10.1007/978-1-4614-6431-0_49-3)
- 2016 S. Perathoner, G. Centi, Science and Technology Roadmap on Catalysis for Europe, European Cluster on Catalysis, ERIC Pub., Brussels 2016, ISBN 979-12-200-1453-3
- 2014 G. Centi, S. Perathoner, Artificial Leaves, Kirk-Othmer Encyclopedia of Chemical Technology, Wiley, April 2014, DOI: 10.1002/0471238961.articent.a01
- 2013 G. Centi, S. Perathoner, Mixed-metal oxides, Comprehensive Inorganic Chemistry II (Vol. 7), 31 pages, Elsevier 2013, DOI:10.1016/B978-0-08-097774-4.00718-X

Research Profile

Starting from the initial background on the photophysics of supramolecular complexes, the scientific focus of prof. Perathoner then moved to the industrial development of catalytic materials and processes initially for environmental applications (water emissions, NO_x abatement in stationary and mobile emissions) and then for sustainable energy and chemical production, particularly electro- and photo-catalytic applications, H₂ production from waste, energy materials based on nanocarbon.

Her research interests include nanostructured oxides, micro-/meso-porous materials and nanocarbons for catalytic applications, using solar energy to convert small molecules (CO₂, H₂O and N₂). While dedicating attention to fundamental aspects and the reaction mechanisms, the core of the activities was on transferring basic research into practical applications. The most significant part of the research was made in the frame of European projects involving many companies, in various cases also coordinating the projects.

Four prototype or pilot industrial units for electrocatalytic processes were realised. Various waste-to-H₂ plants are in construction. Among the pioneering activities, the development of

1. electrocatalysts for the direct electroreduction of CO₂ to C₂-C₃ hydrocarbons/alcohols (among the reporting this possibility already over 15 years ago),
2. artificial-leaf type device for CO₂ reduction (with now world-record solar-to-fuel efficiencies of over 10% at high current density),
3. electrolyte-less electrocatalytic devices (now becoming of broad use to overcome limitations of the current devices),
4. electrodes based on ordered arrays of TiO₂ nanotubes for photo- and electro-catalytic reactions,
5. metal-free nanocarbons for catalytic and electrocatalytic applications,
6. catalytic solutions for carbon circularity (CO₂ reuse),
7. a process to produce H₂ from municipal waste (implemented on an industrial scale)
8. the use of iron-oxide on nanocarbons electrocatalysis for the N₂ electrocatalytic conversion to ammonia.

In parallel to the scientific developments, intense activity was also made in perspective papers leading to highly cited pioneering manuscripts on nanocarbons, layered materials, CO₂ recycling and utilisation, solar fuels and artificial leaf, and fossil-free chemical production. In addition, editor of three books on Sustainable Industrial Chemistry and Green Carbon Dioxide and contributions to encyclopaedias.