PERSONAL INFORMATION

# Mara Serrapede, Ph.D.

Electrochemist with passion for material characterization

[redacted]

Sex Female Date of birth 20/02/[redacted] Nationality Italian

## WORK and EDUCATION

November 2022 - Present — Research Associate (Ricercatore a tempo determinato - RTDA)

Research line of A. Lamberti and F.C. Pirri, Earnest Group, DISAT presso Politecnico di Torino, Torino, Italy

Development of processes and devices for the energy transition.

Activity in the field of electrochemistry and material characterization for high power energy storage and conversion applications

- Design, fabrication and physico-chemical characterization of materials for different electrochemical purposes
- Electrochemical characterization of electrode materials, electrolytes and membranes
- Design and characterization of functional current collectors
- Customization of devices for harsh environments, prolonged endurance, flexible packagings
- Hybridization of storage, harvesting or fuel cells

Active collaboration with Solvay and Martur S.p.a.

October 2018 – October 2022 — Post Doc in Electrochemistry (Collaboratore)

Research line of F.C. Pirri, Advanced Materials for Sustainable Future Technologies, CSFT@Polito Torino, Torino, Italy

Activity in the field of supercapacitors for high power energy storage applications:

- Design, fabrication and characterization of electrode materials employed in Li-ion supercapacitor and battery cells
- Characterization of electrode materials employed in supercapacitor devices by two and three electrode measurements
- Characterization of devices with a range of electroanalytical techniques
- Fabrication and electrochemical characterization flexible supercapacitors

Active collaboration with ENI S.p.a. and Martur S.p.a.

June 2015 – October 2018 — Post Doc in Electrochemistry (Assegnista e borsista)

Group of F.C. Pirri, research line of Prof. E.Tresso, Politecnico di Torino, Torino, Italy

Activity in the field of capacitors for energy storage applications:

- Characterization of electrode materials employed in supercapacitor devices by three electrode measurements
- Characterization of two electrode devices with a range of electroanalytical techniques
- Fabrication and electrochemical characterization flexible supercapacitors
- Fabrication and electrochemical characterization of Li-S batteries.

Active collaboration with ENI S.p.a.

April 2014 – May 2015 — Post Doc in Electrochemistry (Collaboratore)

Energy platform, Istituto Italiano di Tecnologia, IIT@UniLe, Lecce, Italy

Activity in the field of dye sensitized solar cell and energy conversion:

- Fabrication and electrochemical characterization of DSSC
- Fabrication and electrochemical characterization of PVCC and PECC
- Electrodeposition of plain metals
- Characterization of new dyes with voltammetric techniques
- Characterization of DSSC, PVCC and materials with spectroscopic techniques *in situ*.

November 2010 – March 2014 Ph.D. in Chemistry (Electrochemistry)

Group of G.Denuault, Southampton Electrochemistry group, University of Southampton, UK.
Intense activity in the field of electrochemical sensing and material science:

- Fabrication and characterization of potentiometric probes
- Applications and developments in Scanning Electrochemical Microscopy (SECM)
- Electrodeposition of mesoporous metals
- Characterization of mesoporous electrodes with a range of electroanalytical techniques
- Physical characterization of surfaces and materials with Scanning Electron Microscopy (SEM-EDS), X-Ray Diffractometry (XRD), IR spectroscopy, Transmission Electron Microscopy (TEM), Atomic Force Microscopy (AFM)

September 2007-April 2010 Master degree in Science

Laurea magistrale in Scienze e Tecnologie per I Beni Culturali 110/110 cum laude and excellence mention
Thesis title: Thermoluminescence dating: optimization of the experimental procedures and application to archaeological
sites in Piedmont, Italy"
Dipartimento di Fisica Sperimentale-INFN, Universita' degli Studi di Torino, Italy

September 2004-September 2007 Bachelor's degree in Science

Laurea magistrale in Scienze e Tecnologie per I Beni Culturali 110/110 cum laude
Thesis title: Hapi-nu colours: palette's characterization in wooden statues by XRF, PIXE and SEM-EDS.
Dipartimento di Fisica Sperimentale-INFN, Universita' degli Studi di Torino, Italy

## WORK RELATED EXPERIENCE

December 2022 – January 2023 Demonstrator

Supervision of experiments at Politecnico di Torino, Italy
On "Chimica" 16AHMLZ (15 hours of workshop), Prof. Sabrina Grassini,
CHIM/07 - Fondamenti Chimici Delle Tecnologie

December 2021 – January 2022 Demonstrator

Supervision of experiments at Politecnico di Torino, Italy
On "Chimica" 16AHMLZ (15 hours of workshop), Prof. Sabrina Grassini,
CHIM/07 - Fondamenti Chimici Delle Tecnologie

March – June 2017 Lecturer – attività di supporto alla didattica

Lecturer at Politecnico di Torino, Italy
On "Tecnology of construction materials" 01RWEMX (30 hours of lecures) for the course in Civil Engeneering at DISAT. ING-IND/22, ING-IND/23 – Ingegneria dei materiali

May 2016 - March 2017 Demonstrator

Lecturer at Politecnico di Torino, Italy
on Electrochemical characterization of storage devices in the course of "Introduzione alle Nanotecnologie"
Supervision of experiments (cyclic voltammetry, galvanostatic charge-discharge and AC impedance).

January 2015 — Lecturer and demonstrator

Lecturer at DiTech, Universita' del Salento in Lecce, Italy
on 'Tecniche di nano e micro fabbricazione' (M-A3-4).
Supervision of experiments in electrodeposition of metals within molecular templates and application as pH sensor.

June 2013 — Demonstrator

Electrochemistry Summer School 2013, University of Southampton, UK
Supervision of experiments (Rotating Disc Electrodes, electrodeposition of single monolayer); practical and theoretical advice.

June 2012-July 2012 — Demonstrator

International Electrochemistry Summer School 2012, University of Xiamen, China
Supervision of experiments (cyclic voltammetry); gave practical and theoretical advice.

Electrochemistry Summer School 2012, University of Southampton, UK
Supervision of experiments (cyclic voltammetry, electrodeposition of metals within molecular templates); gave practical and theoretical advice

July 2010 — Work placement

LABEC-INFN, Universita' degli Studi di Firenze, Italy
Assistance for laboratory experiments on radiocarbon dating

**Honours and awards**

2012, Best poster prize in Electroanalytical Chemistry at the 63rd Annual Meeting of the ISE
2010, Premio OPTIME from the Confindustria for Master project.

**Invited speaker**

M. Serrapede, M. Fontana, P. Rivolo, M. Castellino, A. Gigot, E. Tresso, C.F. Pirri
"Few-layer mixed 1T-2H phase MoS2 as electrode material in supercapacitor and catalyst for hydrogen evolution reaction"
NanoInnovation 2019, 11-14 giugno **2019**,
Facoltà d'Ingegneria Civile e Industriale – Sapienza Università di Roma, Roma (Italy)
Slot VII.F.3

M. Serrapede, M. Fontana, P. Rivolo, C.F. Pirri, A. Lamberti
"Mixed 1T-2H MoS2 Nanoflakes Electrodes For Li-ion Supercapacitors"
2nd Global Summit and Expo on Graphene and 2D Materials, Edinburgh, Scotland, 22-24 August **2022**

**Reviewer and Editor**

The Journal of Physical Chemistry, ACS
Chemical Engineering Journal, Elsevier
Journal of alloys and compounds, Elsevier
Electrochimica Acta, Elsevier
RSC Advances, RSC
Applied Sciences, MDPI
Micro and Nano Engineering, Elsevier
Reviewer Editor for Frontiers in Environmental Chemistry
Guest Editor of the Special Issue "Energies" (IF: 3.004, ISSN 1996-1073). Title: "Graphene and Beyond: Energy Storage and Conversion Applications in 2D materials".

## Publications:

Carbon, 2023 (213) 118283
DOI: 10.1016/j.carbon.2023.118283

Advanced Material Interfaces, 2023 (17) 2202470
DOI: 10.1002/admi.202202470

Journal of Energy Storage, 2023 (63) 106975
DOI: 10.1016/j.est.2023.106975

Electrochimica Acta, 2023 (53) 142346
DOI: 10.1016/j.electacta.2023.142346

Electrochimica Acta, 2023 (447) 142124
DOI: 10.1016/j.electacta.2023.142124

Colloids Interfaces 2022, 6(4), 75;
DOI: 10.3390/colloids6040075

ChemElectroChem, 2022, 9(10), e202101652
DOI: 10.1002/celc.202101652

Electrochimica Acta, 2021, 390, 138856
DOI: 10.1016/j.electacta.2021.138856

Nanomaterials, 2020, 10(6), 1084
DOI: 10.3390/nano10061084

Materials, 2020, 13(3), 594
DOI: 10.3390/ma13030594

Materials, 2020, 13(1), 21
DOI: 10.3390/ma13010021

Carbon, 2019, 144,91-100
DOI: 10.1016/j.carbon.2018.12.002

Electrochimica Acta, 2019, 296, 709-718
DOI: 10.1016/j.electacta.2018.11.053

2D Materials, 2017, 4 (3), 035012
DOI:10.1088/2053-1583/aa790e

Nanotechnology, 2017, 28 (17), 174002
DOI: 10.1088/1361-6528/aa6615

ACS Appl. Mater. Interfaces, 2016, 8 (48), pp. 32842-32852
DOI: 10.1021/acsami.6b11290

Mater. Res. Express, 2016, 3, 065001
DOI:10.1088/2053-1591/3/6/065001

ACS Appl. Mater. Interfaces, 2016, 8 (16), pp 10459–10465
DOI: 10.1021/acsami.6b00808

34th Cement and Concrete Science Conference, Sheffield, 2014, 105-108

Clay Minerals, 2014, 49, 341–358
DOI: 10.1180/claymin.2014.049.3.01

Anal. Chem., 2014, 86 (12), pp 5758–5765
DOI: 10.1021/ac500310

## Patents:

International publication number: **WO2019/22955A1**
Date: 08/07/2020
Title:“Dispositivo elettrochimico per l'accumulo ad alta energia ed alta potenza a commutazione automatica - HEP”
Inventors: S. Bodoardo, U. Zubair, M. Serrapede, P. Zaccagnini, C. Francia, A. Lamberti, F.C. Pirri, D. Versaci, J.G.N. Amici

International publication number: **WO2019/201887A1**
Patent N. 19717492.3 – 1230 European patent office
Date: 20/11/2020
Title: “Energy storage device for high temperature application”
Inventors: A. Lamberti, M. Serrapede, A. Gigot, S. Carminati, M. Zampato

## Supervisor (Relatore):

Pedam Hosseini: Amorphous W O3 supported on ordered mesoporous carbon as energy storage material. *Politecnico di Torino, Corso di laurea magistrale in Nanotechnologies For Icts (Nanotecnologie Per Le Ict).* ***2021***

Claudio Baudino: Characterization of ion exchange membranes for energy harvesting and storage devices.
*Politecnico di Torino, Corso di laurea magistrale in Nanotechnologies For Icts (Nanotecnologie Per Le Ict)*, ***2020***

Francesco Seller: Funzionalizzazione e caratterizzazione di elettrodi a base carbonio per lo sviluppo di supercondensatori in forma di filo.
*Politecnico di Torino, Corso di laurea magistrale in Ingegneria Dei Materiali*, ***2020***

Mandeep Kang: Characterisation and Applications of Nanostructured PdH Microelectrodes.
*School of Chemistry, Master degree in Chemistry (4th year) University of Southampton, UK,* ***2013***

Samuel Perry: Study into electrochemical methods of etching on glass surfaces for the effective growth of neurones down channels.
*School of Chemistry, Master degree in Chemistry (4th year) University of Southampton, UK,* ***2012***

Anal. Chem., 2013, 85 (17), pp 8341-8346
DOI: 10.1021/ac4017055

## PERSONAL SKILLS

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| Mother tongue(s) | Italian |
| Other languages | English, level C1 |

### Communication skills

-Team work: I worked in teams during my Post Docs, PhD and my training in the previous scientific laboratories;

-Collaboration: I am actually working and I used to work with people from different countries and different scientific areas such as engineers, material scientists, physicists, chemists and (in the very past) archaeologists.

-Didactics and popularization: I worked with Fellows and Postgraduated students (Master and PhD) at Politecnico and IIT, project students from the third and fourth year of their degree in chemistry at the University of Southampton and with students of the third year at the Universita' di Torino. I also worked for few days with students from the high school during their visits in both IIT and University of Southampton. I presented posters during some events and I had oral talks in specific field of my research.

### Job-related skills

- ALBII "Albo degli studiosi e degli esperti esterni al Politecnico di Torino qualificati allo svolgimento di attività didattica" for the disciplines:
FIS/01 – Fisica Sperimentale
FIS/03 - Fisica Della Materia
CHIM/07 - Fondamenti Chimici Delle Tecnologie
ING-IND/22 - Scienza E Tecnologia Dei Materiali

- During my Post Doc I learned how to fabricate photovoltaic and electrochromic devices and to test them by standard iV characterization and by spectroscopic techniques *in situ*.
- During the PhD I learned how to use and master some of the most important electrochemical techniques such as cyclic voltammetry, chronoamperometry, chronopotentiometry, sampled current voltammetry at microelectrodes and on rotating disc electrode, electrochemical quartz crystal micro balance (EQCM), impedance spectroscopy (EIS) and galvanostatic intermittent titration technique (GITT). I also built the Scanning Electrochemical Microscope by using three positional stages and the electrochemical work station. I know how to make reference electrodes and micro- and nanoelectrodes. I used intensively Scanning Electron Microscopy (SEM-EDS) and Transmission Electron Microscopy (TEM), Raman and FT-IR Spectroscopy .
- During the Master degree project I contributed to set up a laboratory for Thermoluminescence dating using a TL apparatus, a beta particles irradiator, an alpha particles counter and a gamma ray counter used to perform measurements of natural radioactivity.
- During the graduated studies and during the Bachelor project I used many analytical and optical techniques such as Optical Microscopy, X-ray Energy Dispersive Spectroscopy (SEM-EDS), X-ray Fluorescent Spectroscopy (XRF), X-ray Diffractometry, Infra-Red Spectroscopy (FT-IR and ATR), Raman spectroscopy, atomic emission spectroscopy (ICP-OES), UV-vis-IR Spectroscopy and Colorimetric techniques and many chromatographic techniques.

### Computer skills

- Hardware: able to install, change and configure peripherals and instrumentation connected to a computer.
- Software: knowledge of the operating system Microsoft Windows, competent with most Microsoft Office programmes (Word, Excel, Power Point), good command of Origin, Fityk and Sigmaplot for the data analysing and advance knowledge in MAUD, QualX and electrochemical software as NOVA, GPES and UNISCAN and Arbin.

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| Driving licence | I hold the Italian driving licence, category B vehicles |

Mara Serrapede allows IIT to process her personal data according to the art. 23 of Privacy Law of the Italian Legislative Decree n. 196/03.