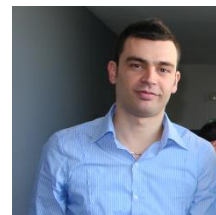


## CV of the Researcher



### BRIEF CV

Sebastiano Garroni is a research scientist with nearly 10 years research experience in synthesis and characterization of materials for energy storage and conversion. He obtained the Chemistry Degree (cum laude) on 2007 from the University of Sassari and he conducted his European PhD in Materials Science at the Universitat Autònoma de Barcelona financed by an ITN Marie Curie Network Project titled COSY. After receiving the European PhD in 2011, he joined the physical chemistry group at the University of Sassari as post doc fellowship. In November 2012, He was contracted as Assistant Professor at Department of Chemistry and Pharmacy of the University of Sassari. He joined ICCRAM-UBU research centre (Burgos-Spain) in 2016 as researcher within the European project Nanopiezoelectrics financed by the Marie Skłodowska-Curie Individual Fellowship (IF) action (GA 707954). Since November 2018, he is Assistant Professor (Physical Chemistry) of the University of Sassari.

Due to the significant number of papers published and the important results achieved during the PhD, Dr. Sebastiano Garroni received the PhD UAB Extraordinary Award in 2012. So far, He has published more than 88 articles with around 1000 citations (h-index = 17) and 1 international patent (PCT 2013WO-IT00179). He participated in more than 30 national and international conferences, with 17 oral contributions (4 invited - 1 plenary). He has a proven ability to gain and successfully conduct research projects. Among them the MSCA-IF-2015 grant (172.000 €), a MSCA - RISE (702.000 €) and an Under40- Legge7 (70.000 €) Regional project as Scientific Coordinator.

His principal research interests are devoted to the study of novel lead-free piezoceramics, materials for energy storage (hydrogen storage materials) and nanostructured materials for heterogeneous catalysis. He also collaborates as peer reviewer for the following Journals: Journal of Alloys and Compounds, International Journal of Hydrogen Energy Journal of Physical Chemistry C and Materials Chemistry and Physics.

## FULL CV

### PERSONAL INFORMATION

Name Garroni, Sebastiano

Date of birth 25 December 1980

Web Page <http://www3.ubu.es/iccram/nano-piezoelectrics/>

### EDUCATION

01/09/2001 – 07/03/2007 Master Degree cum Laude in Chemistry gained at Department of Chemistry and Pharmacy, University of Sassari, Italy. Topic: Preparation of nanostructure catalysts for the mechanically induced Fischer-Tropsch reaction.

15/03/2007 – 21/01/2011 European PhD in Material Science cum Laude gained at Department of Physics, Universitat Autònoma de Barcelona (UAB) Spain, involved in a Marie Curie Network titled COSY (MRTN-CT-2006-035366). Topic: Study of reactive complex hydride composite based on NaBH<sub>4</sub>-MgH<sub>2</sub> system as promising candidate for hydrogen storage materials for on-board application.

### PREVIOUS POSITIONS

15/03/2011 – 01/11/2012 Post-doc fellowship at Department of Chemistry and Pharmacy, University of Sassari, Sassari. Topics: Investigation of innovative materials for solid-state hydrogen storage. Preparation and characterization of photoelectron catalysts for hydrogen production by water splitting reaction. Synthesis and characterization of anode and cathode materials for secondary Lithium-ion batteries and PEM Fuel cells.

01/11/2012 – 01/11/2015 Assistant Professor (not permanent position) at Department of Chemistry and Pharmacy, University of Sassari, Sassari. Topics: Synthesis and characterization of highly ordered mesoporous matrices by sol-gel routes for piezoelectric and dielectric devices. Synthesis of metastable alloys and control of solid-solid and gas-solid reactions by ball milling processes under controlled energy input. Structural investigation by Neutron and X-Ray Powder Diffraction and quantitative structural refinement procedures according to the Rietveld method. Solid state Nuclear Magnetic Resonance applied to functional materials for energy conversion and storage.

01/11/2016 – 01/11/2018

Marie Skłodowska-Curie Individual Fellowship (IF) at the University of Burgos. The research activity is mainly focused on the synthesis and characterization of novel nano piezoelectric PZT materials.

#### CURRENT POSITION

Assistant Professor at Department of Chemistry and Pharmacy, University of Sassari, Sassari. Course: Physical Chemistry. Topics: Synthesis and characterization of lead-free piezoceramics. Synthesis of metastable alloys and control of solid-solid and gas-solid reactions by ball milling processes under controlled energy input. Structural investigation by Neutron and X-Ray Powder Diffraction and quantitative structural refinement procedures according to the Rietveld method. Solid state Nuclear Magnetic Resonance applied to functional materials for energy conversion and storage.

#### FELLOWSHIPS AND AWARDS

22/11/2012 PhD UAB Extraordinary Award from the Universitat Autònoma de Barcelona as best PhD thesis in Material Science (2011)

27/03/2012 – 05/04/2012 COST Grant. COST STSM Reference Number: COST-STSMMP1103-10255. Visiting at Dept. of Nanotechnology, Materials Technology, Helmholtz-Zentrum Geesthacht (Germany) and at DESY Synchrotron radiation Facility, Hamburg (Germany) for in-situ XRPD measurements.

26/05/2013 – 04/06/ 2013 COST Grant. COST STSM Reference Number: OST-STSMMP1103-13185. Visiting at Dept. of Nanotechnology, Materials Technology, Helmholtz-Zentrum Geesthacht (Germany) and at Max Lab Synchrotron radiation Facility, Lund (Sweden) for in-situ XRPD measurements.

20/10/2014 – 27/10/ 2014 COST Grant. COST STSM Reference Number: OST-STSMMP1103-20402. Visiting at Dept. of Nanotechnology, Materials Technology, Helmholtz-Zentrum Geesthacht (Germany) and at Max Lab Synchrotron radiation Facility, Lund (Sweden) for in-situ XRPD measurements.

#### TECHNICAL SKILLS AND COMPETENCES

His principal research interests and competences are described in the following:

- Synthesis and Characterization of complex hydrides for solid-state hydrogen storage

- Synthesis and characterization of highly-ordered mesoporous matrices by sol-gel routes for piezoelectric and dielectric devices. This activity has started in 2012 with significant results published in a high impact journal (IF 6.626 - 2012) [44] and patented (international) (1).
- Synthesis of alloys, composites and functional materials by high-energy ball milling
- Structural investigation by Neutron and X-Ray Powder Diffraction and quantitative structural refinement procedures according to the Rietveld method.
- Several projects accepted for measuring (2007-2014) in synchrotron and neutron European facilities (ESRF, MAX LAB, ILL).
- Evaluation of Thermal properties and thermodynamic stability by calorimetric methods, HP-DSC, TG-DTA.
- Surface analyses: measurements of specific surface area by nitrogen physisorption according to B.E.T. method.
- Microstructural and Morphological evaluation of nanostructured materials by Transmission Electron Microscopy (TEM) and Scanning Electron Microscopy (SEM) instruments.
- Solid-state Nuclear Magnetic Resonance and Raman spectroscopy competence

#### SUPERVISION OF GRADUATE STUDENTS AND POSTDOCTORAL FELLOWS

15 among bachelor, master PhD students

#### TEACHING ACTIVITIES

01/03/2013 – 01/06/2013 Holder – Introduction to Heterogeneous Catalysis, Department of Chemistry and Pharmacy, University of Sassari, Italy.

01/03/2014 – 01/06/2014 Holder – Introduction to Heterogeneous Catalysis, Department of Chemistry and Pharmacy, University of Sassari, Italy.

01/02/2012 – 01/03/2012 « Progetto Lauree Scientifiche 2013» organization and dissemination of pillar basic experiment for young students (secondary school). Topic: Solar Cell (Graetzel)

01/02/2013 – 01/03/2013 « Progetto Lauree Scientifiche 2013» organization and dissemination of pillar basic experiment for young students (secondary school). Topic: CO<sub>2</sub> in water

02/11/2018 – current Holder. Physical Chemistry, Department of Chemistry and Pharmacy, University of Sassari, Italy.

## PROJECTS

- 1) 2007-2010. Marie Curie Training Network, COSY “Complex Solid State Reactions for Energy Efficient Hydrogen Storage” , PhD student, 36 months
- 2) 2011-2012. MIUR, Prin, “Synthesis, characterization and functional evaluation of light hydrides based nanostructured materials and nanoparticles for solid state hydrogen storage”, Research Unit, 12 months.
- 3) 2014-2016. Joint Project - Progetto Congiunto Italia-Argentina “Development and optimization of materials for hydrogen storage based on Li-N-H systems”, Scientific Coordinator, 36 months.
- 4) 2013-2015. Progetto Cluster Top Down “Tecnologie integrate e innovative per il consolidamento e la protezione delle Superfici dei Beni Culturali / Multi-approach Technologies for the Reinforce and Protection of Cultural Heritage Surfaces” Acronimo MUSA, Research Unit.
- 5) 2015-2016. Progetto Fondazione Banco di Sardegna “Sistemi innovativi di conversione di energia elettrica da fonti rinnovabili: Sviluppo di Elettrocatalizzatori Biomimetici per Celle a Combustibile a Scambio Protonico” Biomimetic electro-catalysts for efficient energy production. Euro: 10.000. Scientific Coordinator, 12 months.
- 6) H2020-MSCA-IF-2015, Title: Novel Nanoporous PZT Materials for Efficient Ultrasonic Biomedical Sensors - NanoPiezoelectrics. Financial support: 170.122,00 € (100%). Score: 91.80%. Duration 24 months.
- 7) Horizon 2020 - Research and Innovation Framework Programme (RISE). Title: CO2 absorbing Materials Project- RISE - CO2MPRISE. Financial support: 702.000,00 €. International Coordinator. Duration: 48 month
- 8) Legge 7 – Under 40. Title: Sistemi innovativi di conversione di anidride carbonica a metano da fonti rinnovabili. Financial support: 70.000 € (100%). Duration 12 month. Scientific Coordinator.

## ORGANISATION OF SCIENTIFIC MEETINGS

01 – 02/06/2009 Organizer, Workshop RIETVELD REFINEMENT OF DIFFRACTION PATTERNS/ Italy

## PATENTS

1) Mulas, G; Garroni, S; Tolu, E; Barò, M; Sort Vinas, J; Pellicer Vilà, E. Mesoporous, highly ordered magnesium and niobium based ternary oxide compound, process for its preparation and uses. PCT Patent Application 2013WO-IT00179, filed June 2012. Publication number WO2014013518.

#### MAJOR COLLABORATIONS

- Prof. Francesco Delogu and colleagues, Dipartimento di Ingegneria Meccanica, Chimica e dei Materiali, University of Cagliari, UNICA, Italy. Topic: Mechanochemical reactions.
- Prof. Chiara Milanese, Prof. Amedeo Marini, Pavia H2 Lab, C.S.G.I. & Dipartimento di Chimica, Sezione di Chimica Fisica, Università di Pavia, Italy. Topic: Hydrogen storage Materials
- Prof. Thomas Klassen, Dr. Martin Dorheim, Dr. Claudio Pistidda, Institute of Materials Research, Materials Technology, Helmholtz-Zentrum Geesthacht, Germany. Topic: Hydrogen Storage Materials/Photocatalytic Hydrogen Water Splitting
- Dr. Pietro Moretto, Dr. Emilio Napolitano, JRC-IE, Westernduinweg 3, 1755 ZG Petten, The Netherlands. Topic: Hydrogen Storage Materials
- Prof. Maria Dolores Baró, Prof. Santiago Surinyach, Prof. Jordi Sort, and Dr. Eva Pellicer, Departament de Física, Universitat Autònoma de Barcelona, Spain. Topic: Mesoporous Materials/Hydrogen Storage Materials/Piezoelectric and Dielectric Materials
- Dr. Christopher Schuh, Department of Materials Science and Engineering, Massachusetts Institute of Technology MIT, USA. Mechanochemical Reactions
- Prof. Lorena Pardo, Instituto de Ciencia de Materiales de Madrid. Consejo Superior de Investigaciones Científicas (CSIC), Madrid (Span).

#### ORAL CONTRIBUTIONS

- 1). Garroni. S.; et al. “Dehydrogenation mechanism of the  $2 \text{NaBH}_4 + \text{MgH}_2$  prepared by ball milling”, Oral presentation at 3rd International Symposium Hydrogen & Energy. 25-30.01.2009, Braunwald, Switzerland.
- 2). Garroni, et al. “Sorption properties of the  $\text{NaBH}_4/\text{MgH}_2$  system: dehydrogenation mechanism and pathway”, oral presentation at MRS fall meeting 2009. 30 November – 4 December, 2009, Massachusetts, Boston, USA.

- 3). Garroni, et al. "Sorption properties of NaBH<sub>4</sub>/MH<sub>2</sub> (M = Mg, Ti) systems", oral presentation at 4th International Symposium Hydrogen & Energy. 24-29.01.2010, Wildhaus, Switzerland.
- 4). Garroni, S.; et al. "Progress on the study of the sorption properties of the NaBH<sub>4</sub>/MgH<sub>2</sub> system", oral presentation at ISMANAM 2010, 4-9.07.2010, ETH, Zurich, Switzerland.
- 5). Garroni, S.; et al. "Progress on Sodium-Borohydride based Reactive Hydride Composite (RHC)", oral presentation at COSY-NESSHY joint meeting, 4-5.10.2010, Envipark, Turin, Italy.
- 5). Garroni, S.; et al. "Ordered Mesoporous Scaffolds for the Confinement of Nano-sized Complex and Metal Hydrides" oral presentation at MH2012, October 21-26 2012. Kyoto, Japan.
- 7). Garroni, S; et al. "Multicomponent LiBH<sub>4</sub>-LiAlH<sub>4</sub>-MgH<sub>2</sub> hydrogen storage system: in-situ synchrotron radiation powder diffraction studies" oral presentation ISMANAM 2013, June 30 – July 5, 2013, Turin, 2013.
- 8). Garroni, S.; Delogu, F.; "Reactive multilayers and mechanical alloying: a supposedly odd couple." Invited speaker at Reactive Multilayers Foils - Bridging the gap from Thermodynamics, Modelling and Experiments. CECAM Workshop, July 8, 2013 to July 10, 2013, Lausanne, Switzerland.
- 9) Garroni, S.; "The mechanochemical route to the nanoscale", invited speaker at International Workshop on Advanced Nuclear Materials, July 17-18, 2014, Gijon, Spain.
- 10) Garroni S., et al. "New insights upon desorption process of the Mg/K amide system" oral presentation at 14 th International Symposium on Metal hydrogen systems, July 20-25, 2014, Manchester, UK.
- 11) Garroni S.; "Materials for Hydrogen Storage". Summer School for PhD student, Oral presentation (Invited), 13-16 July, 2015, Brexén, Italy.
- 12) Garroni S.; "Mechanochemistry: from Macroscopic evidence to microscopic mechanism. Plenary lecture at International Symposium on Mechanochemistry, Montpellier, 15-17 July 2015.
- 13) Garroni S.; "Effect of aluminum-based dopants on the Li-N-H system". Oral presentation at Hypothesis XI symposium 2015, Toledo, September 6-9, 2015, Toledo, Spain
- 14) Garroni S.; et al., Deepening the Insight into the Kinetics of Mechanically Activated

Transformations, Oral presentation at Materials Science & Technology MS&T16, Salt Lake City, October 23-27 2016, USA.

15) Garroni S.; et al., Mechanochemical transformations by ball milling: From processing parameters to chemical kinetics, Oral presentation (Invited) at Materials Science and Technology conference, Catania, December 12 - 16, 2016, Italy.

16) Garroni S.; et al., High-Energy Ball Milling: a powerful technique for the synthesis of new alloys and nanostructured materials, Oral presentation (Invited) at International Spring School on Forefront Alloys and Advanced Materials for Extreme Conditions, Tula (Cagliari) May 15 - 17, 2017, Italy.

17) Garroni S.; et al., Aluminum Chloride as effective dopant in Amide-based systems , Oral presentation (Invited) at EMRS fall meeting 2017, Warsaw, September 18 - 21, 2017, Poland.

18) Garroni S.; et al., Piezoelectric Behavior of Lead-free  $K_xNa_{(1-x)}NbO_3$  prepared by facile synthesis via Water Soluble Precursors, Oral Presentation at EMRS Spring meeting 2018, Strasburg, June 18-22, France.

19) Garroni S.; et al., On the microstructural characterization of piezoceramics using Rietveld method, Oral presentation at V Congreso Hispano-Luso de Cerámica y Vidrio, 7-11 October, Spain.