

# Curriculum Vitae

**Name:** Mauro Francesco Sgroi

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## Studies

### **PhD in Materials Science and Technologies**

- University: University of Turin
- Period: 1/11/2001 – 18/11/2005
- Thesis: “Small fuel cells for portable applications”

### **Master’s degree in Materials Science**

- University: University of Turin
- Graduation date: 16/03/2001
- Thesis: “Simulazione quantomeccanica delle proprietà strutturali ed elettroniche di film ultrasottili di MgO su argento”

## Professional and academic career

- **Fixed term researcher (RTDB)**
  - Body: University of Turin
  - Period: 2022 – today
  - Research activity: Development and first-principle modelling of materials for batteries and supercapacitors
- **Researcher**
  - Body: Centro Ricerche FIAT
  - Period: 2001 – 2022
  - Role: Responsible of research unit
  - Research activity: new materials for energy generation and storage (fuel cells, batteries, supercapacitors, fuel production). Materials for tribological application. Ab-initio simulation of materials.

## Selected research projects

- **Coordinator of the Italian research project “METISOL - Produzione di miscele METano-Idrogeno con cicli termochimici alimentati da energia SOLare e sistemi di stoccaggio a bordo veicolo”**
  - Funding body: Ministero dell’Ambiente e della Tutela del Territorio e del Mare
  - Activity: Development of porous sorbent materials for the storage of methane/hydrogen mixtures.
  - Period: 2011-2014
- **“Zeocell - Nanostructured electrolyte membranes based on polymer-ionic liquids-zeolite composites for high temperature PEM fuel cell”**

- Funding body: European Commission – FP7 - Grant agreement ID: 209481.
- Activity: preparation of porous polymeric membranes for high temperature fuel cells.
- Period: 2008-2010
- **“SSH2S - Fuel Cell Coupled Solid State Hydrogen Storage Tank”**
  - Funding body: European Commission - FP7 - Grant agreement ID: 256653
  - Activity: development of an hydrogen storage system based on complex hydrides.
  - Period: 2011 - 2015
- **“Ecaiman - Electrolyte, Cathode and Anode Improvements for Market-near Next-generation Lithium Ion Batteries”**
  - Funding body: European Commission – H2020 - Grant agreement ID: 653331
  - Activity: first-principle simulation of high voltage spinel materials for Li-ion cell cathodes.
  - Period: 2015-2018
- **“Si-Drive - Silicon Alloying Anodes for High Energy Density Batteries comprising Lithium Rich Cathodes and Safe Ionic Liquid based Electrolytes for Enhanced High Voltage Performance”**
  - Funding body: European Commission – H2020 - Grant Agreement n°814464
  - Activity: Electrochemical characterization of materials for Li-ion cell applications.
  - Period: 2019 – 2022
- **“Spider - Safe and Prelithiated high energy Density batteries based on sulphur Rocksalt and silicon chemistries”**
  - Funding body: European Commission – H2020 - Grant Agreement n° 814389
  - Activity: first-principle simulation of sulphur-based cathode materials with disordered rock-salt structure.
  - Period: 2019 – 2022
- **“Modalis2 - MODelling of Advanced LI Storage Systems”.**
  - Funding body: European Commission – H2020 - Grant Agreement n° 875193
  - Activity: chemical physical characterization of materials for Li-ion cells. first principle modelling of cathodes and electrolytes.
  - Periodo: 2020 – 2022
- **“Solidify: Liquid-Processed Solid-State Li-metal Battery: development of upscale materials, processes and architectures.”**
  - Funding body: European Commission – H2020 - Grant Agreement n° 875557
  - Activity: chemical physical characterization of solid-state electrolytes
  - Period: 2020 – 2022
- **“SUBLIME - Solid state sulfide Based LI-Metal batteries for EV applications”**
  - Funding body: European Commission – H2020 - Grant Agreement n° 875028
  - Activity: chemical physical characterization of solid-state electrolytes based on sulphides.
  - Periodo: 2020 – 2022

## Patents

1. WO 2011117692 (A1): “Method for the production of polymeric membranes having an ordered arrangement of high aspect-ratio nanopores, by means of heavy ion bombing”, 29/09/2011;

2. EP 1701403 (B1): "System for feeding gaseous fuel, in particular hydrogen, for fuel cells", 05/11/2008;
3. EP 1385225 (B1) "Direct-alcohol fuel-cell and corresponding method of fabrication", 21/05/2008;
4. EP 1627933 (B1): "Method and device for adsorbing and/or desorbing hydrogen with the aid of shape memory materials", 14/03/2007;
5. EP 1627932 (B1): "Method and device for adsorbing and/or desorbing hydrogen in shape memory alloys", 14/03/2007;
6. US 20050155639 (A1): "An electricity generator device including a combustor matrix of porous semi-conductor material", 21/07/2005.
7. EP 1550826 (B1): "A combustion light-emitting device and corresponding method of fabrication", 05/07/2006;
8. EP 1621812 (A1): "A combustion chamber device", 01/02/2006;
9. US 20050167987 (A1) "Electric generator having a magneto- hydrodynamic effect", 04/08/2005;
10. US20050160737 (A1): "A rotary combustor, and electrical generator comprising a combustor of this type", 28/07/2005;
11. EP1548924 (A1): "A microcombustion electricity generator", 29/06/2005.

#### Selected publications

1. **"Computational Characterization of  $\beta$ -Li<sub>3</sub>PS<sub>4</sub> Solid Electrolyte: From Bulk and Surfaces to Nanocrystals"**, N. L. Marana, M. F. Sgroi, L. Maschio, A. M. Ferrari, M. D'Amore, S. Casassa, *Nanomaterials*, 2022, doi.org/ 10.3390/nano12162795
2. **"From symmetry breaking in the bulk to phase transitions at the surface: a quantum-mechanical exploration of Li<sub>6</sub>PS<sub>5</sub>Cl argyrodite superionic conductor"**, M. D'Amore, L. E. Daga, R. Rocca, M. F. Sgroi, N. L. Marana, S. M. Casassa, L. Maschio, A. M. Ferrari, *Physical Chemistry Chemical Physics*, doi.org/10.1039/D2CP03599E
3. **"Disordered Rock-Salt Type Li<sub>2</sub>TiS<sub>3</sub> as Novel Cathode for LIBs: A Computational Point of View"**, R. Rocca, M. F. Sgroi, B. Camino, M. D'Amore, A. M. Ferrari, *Nanomaterials*, 2022, doi.org/10.3390/nano12111832
4. **"Development of an Innovative Procedure for Lithium Plating Limitation and Characterization of 18650 Cycle Aged Cells for DCFC Automotive Applications"**, M. Dotoli, E. Milo, M. Giuliano, A. Tiozzo, M. Baricco, C. Nervi, M. Ercole, M. F. Sgroi, *Batteries*, 2022, doi.org/10.3390/batteries8080088
5. **"A review of mechanical and chemical sensors for automotive Li-ion battery systems"**, M. Dotoli, R. Rocca, M. Giuliano, G. Nicol, F. Parussa, M. Baricco, A. M. Ferrari, C. Nervi, M.F. Sgroi, *Batteries*, 2022, doi.org/10.3390/s22051763
6. **"Cycle aging and physico-chemical characterization of commercial cells of automotive interest"**, M. Dotoli, R. Rocca, M. Giuliano, M. Sgroi, L. Belforte, N. Li Pira, G. Mangione, E. Milo, G. Nicol, F. Parussa, *SAE Conference Paper*, doi.org/10.4271/2022-01-0276
7. **"Recent progress in solid state high voltage lithium-ion battery electrolytes"**, A. Ahniyaz, I. de Meatza, A. Kvasha, O. Garcia-Calvo, I. Ahmed, M. F. Sgroi, M. Giuliano, M. Dotoli, M. A. Dumitrescu, M. Jahn, and N. Zhang, *Advances in Applied Energy*, 2021, 4, doi.org/10.1016/j.adapen.2021.100070
8. **"Detection of Lithium Plating in Li-Ion Cell Anodes Using Realistic Automotive Fast-Charge Profiles"**, M. Dotoli, E. Milo, M. Giuliano, R. Rocca, C. Nervi, M. Baricco, M. Ercole and M. F. Sgroi, *Batteries*, 2021, 7 (46), doi.org/10.3390/batteries7030046
9. **"Lithium Polysulfide Interaction with Group III Atoms-Doped Graphene: A Computational**

- Insight**", M. Sgroi, D. Pullini, A.I. Pruna, *Batteries*, 6, 2020, doi:10.3390/batteries6030046
10. **"Role of hydrogen tanks in the Life Cycle Assessment of fuel cell based Auxiliary Power Units"**, A. Agostini, N. Belmonte, A. Masala, J. Hu, P. Rizzi, M. Fichtner, P. Moretto, C. Luetto, M. Sgroi, M. Baricco, *Applied Energy*, Volume 215, 2018, pp. 1-12, doi: 10.1016/j.apenergy.2018.01.095
  11. **"New ecofriendly low-cost binders for Li-ion anodes"**, D. Versaci, R. Nasi, U. Zubair, J. Amici, M. Sgroi, A. Dumitrescu, C. Francia, S. Bodoardo, N. Penazzi, *Journal of Solid State Electrochemistry*, 2017, doi: 10.1007/s10008-017-3665-5
  12. **"Doping LiMnPO<sub>4</sub> with cobalt and nickel: a density functional theory study"**, M.F. Sgroi, D. Pullini, R. Lazzaroni and D. Beljonne, *Batteries*, Volume 3, 2017, pp. 11-21, doi: 10.3390/batteries3020011
  13. **"SSH2S: hydrogen storage in complex hydrides for an auxiliary power unit based on high temperature polymeric fuel cells"**, M. Baricco, M. Bang, M. Fichtner, B. Hauback, M. Linder, C. Luetto, P. Moretto, M. F. Sgroi, *Journal of Power Sources*, Volume 342, 2017, pp. 853-860, doi: dx.doi.org/10.1016/j.jpowsour.2016.12.107
  14. **"Cost Analysis of Direct Methanol Fuel Cell Stacks for Mass Production"**, M. F. Sgroi, F. Zedde, O. Barbera, A. Stassi, D. Sebastián, F. Lufrano, V. Baglio, A. S. Aricò, J. Linder Bonde and M. Schuster, *Energies*, Volume 9(12), 2017, p. 1008, doi:10.3390/en9121008
  15. **"Enhancing the capacitance and active surface utilization of supercapacitor electrode by graphene nanoplatelets"**, D. Pullini, V. Siong, D. Tamvakos, B. Lobato Ortega, M.F. Sgroi, A. Veca, C. Glanz, I. Kolaric, A. Pruna, *Composites Science and Technology*, Volume 112, 2015, pp. 16–21, doi:10.1016/j.compscitech.2015.03.004
  16. **"Electrocapacitance of hybrid film based on graphene oxide reduced by ascorbic acid"**, A. Pruna, D. Tamvakos, M. Sgroi, D. Pullini, E. A. Nieto, D. Busquets-Mataix, *International Journal of Materials Research*, Volume 106(4), 2015, pp. 398-405, doi: 10.3139/146.111193
  17. **"Nanoporous PBI Membranes by Track Etching for High Temperature PEMs"**, A. Eguizábal, M. Sgroi, D. Pullini, E. Ferain, M. P. Pina, *Journal of Membrane Science*, Volume 454, 2014, pp. 243–252, doi:10.1016/j.memsci.2013.12.006
  18. **"Improved Pd electro-catalysis for oxygen reduction reaction in direct methanol fuel cell by reduced graphene oxide"**, R. Carrera-Cerritos, V. Baglio, A.S. Aricò, J. Ledesma-García, M.F. Sgroi, D. Pullini, A.J. Pruna, D.B. Mataix, R. Fuentes-Ramírez, L.G. Arriaga, *Applied Catalysis B: Environmental*, Volume 144, 2014, pp. 554–560, doi:10.1016/j.apcatb.2013.07.057
  19. **"Study of an Electrochemical Alcohol Concentration Sensor: Optimization of the Anode Structure"**, M. Sgroi, G. Bollito, G. Innocenti, G. Saracco, S. Specchia, U. A. Icardi, *Journal of fuel cell science and technology*, Volume 4, 2007, pp. 345-349, doi:10.1115/1.2756558
  20. **"Bio-diesel Fuel Processor for an automotive fuel cell auxiliary power unit"**, M. Sgroi, G. Bollito, G. Saracco, S. Specchia, *Journal of Power Sources*, Volume 149, 2005, pp. 8-14, doi: http://dx.doi.org/10.1016/j.jpowsour.2004.12.059