Last up-date March 2021

Chronological prospect of scientific activity and academic carrier.

2002 Degree in Pure Chemistry (5 years course) at the at the University of Turin with the thesis "Study of the oxide-sulphide transformation: reactivity of alkali-earth metal oxides with sulphur containing molecules".

2002 Fellowship at the Politecnico di Torino for the project "Alloys and intermetallic compounds: stability and electrochemical behaviour of amorphous alloys and intermetallic compounds".

2007 PhD in Chemistry, with the PhD thesis "Non conventional synthesis of pure and doped semiconductor oxide at high dispersion for chemical and photochemical applications" was achieved.

2007-2012 Post-Doctoral position at the University of Turin and involved in several projects concerning the synthesis and characterization of pure and doped semiconducting oxides for photochemical application.

2012-2019 Researcher in Inorganic Chemistry. University of Turin, Italy.

Current Position:
Associate Professor in Inorganic Chemistry. University of Turin, Italy.

Teaching activities.

- GENERAL AND INORGANIC CHEMISTRY A (CHIMICA GENERALE E INORGANICA A MAT0111)
  Scuola Universitaria Interdipartimentale in Scienze Strategiche (SUISS). Università di Torino
- GENERAL INORGANIC CHEMISTRY WITH LABORATORY (CHIMICA GENERALE E INORGANICA E LABORATORIO - MFN1163)
  Corso di Laurea Triennale in Chimica e Tecnologie Chimiche. Università di Torino
- GENERAL INORGANIC CHEMISTRY WITH LABORATORY (CHIMICA GENERALE E INORGANICA CON LABORATORIO – MFN0631)
  Corso di Laurea Triennale in Scienza e tecnologia dei materiali. Università di Torino
- INORGANIC SYNTHESIS (SINTESI INORGANICHE CHI0053)
  Laurea Magistrale in Chimica. Università di Torino

Research activities.

The research activity involves the solid state chemistry and in particular the chemistry of the surfaces of the solids and its applications in the field of heterogeneous catalysis. The research activity has also involved the field of hydrogen storage, a sector of strategic importance in the field of renewable energy. The study concerned intermetallic systems (alloys Zr-Ni-V) and the development of additives (mainly ternary systems Mg-Nb-O) to improve the properties of absorption and desorption of hydrogen of the system MgH_2.

In the field of heterogeneous catalysis two aspects have been developed in these years. The first more inherent to the field of surface chemistry and in particular the work has focused on the characterization of the interaction of various molecules (i.e. H_2S, SO_2, CS_2 C_2H_2, H_2O) with the oxides surface.

The second one concerns the synthesis and characterization of semiconducting oxides for photocatalytic applications, in particular using doping procedures to modify its chemical and physical properties. In this second context, the study has mainly focused on the nature of defects in solids and

their role in the catalytic properties of the materials. Great attention has been spent on the TiO_2 system due to its importance in the field of photocatalysis and in particular to TiO_2 systems doped with non-metallic elements such as N, B, C and F in order to photosensitize the solid to the visible component of the solar spectrum.

Publications
S. Livraghi is Co-Author of 60 papers on international journals. Up today these papers received more than 4600 citations in the literature with an h-index of 26 (source: http://apps.scopus.).

Publications in the last five years.

1) Chen H-Y. T., **Livraghi S.**, Giamello E., Pacchioni G.,
"Mechanism of the Cyclo-Oligomerisation of C_2H_2 on Anatase TiO_2 (101) and (001) Surfaces and Their Reduction: An Electron Paramagnetic Resonance and Density Functional Theory Study"
ChemPlusChem 81 (2016) 64–72.

2) Panarelli E.G., **Livraghi S.***, Maurelli S., Polliotto V., Chiesa M., Giamello E.
"Role of surface water molecules in stabilizing trapped hole centres in titanium dioxide (anatase) as monitored by electron paramagnetic resonance"
Journal of Photochemistry and Photobiology A: Chemistry 322 (2016) 27–34.

3) Polliotto V., Morra S., **Livraghi S.**, Valetti F., Gilardi G., Giamello E.,
"Electron transfer and H_2 evolution in hybrid systems based on [FeFe]-hydrogenase anchored on modified TiO_2"
International Journal of Hydrogen Energy. 41 (2016) 10547-10556.

4) **Livraghi S.**, Barbero N., Agnoli S., Barolo C., Granozzi G., Sauvage F., Giamello E.,
"A multi-technique comparison of the electronic properties of pristine and nitrogen-doped polycrystalline SnO_2"
*Physica*l *Chemistry Chemical Physics* 18 **(**2016) 22617-22627.

5) Chiesa M., **Livraghi S.**, Giamello E., Albanese E., Pacchioni G.,
"Ferromagnetic Interactions in Highly Stable, Partially Reduced TiO_2 : The S=2 State in Anatase"
Angewandte Chemie-International Edition. 56 (2017) 2604-2607.

6) Dozzi M.V., Chiarello G., Pedroni M., **Livraghi S.**, Giamello E., Selli E.,
"High photocatalytic hydrogen production on Cu(II) pre-grafted Pt/TiO_2"
Applied Catalysis B: Environmental 209 (2017) 417–428.

7) Polliotto V., Albanese E., **Livraghi S.**, Indyka P., Sojka Z., Pacchioni G., Giamello E.,
"Fifty−Fifty Zr−Ti Solid Solution with a TiO_2-Type Structure: Electronic Structure and Photochemical Properties of Zirconium Titanate $ZrTiO_4$.
Journal of Physical Chemistry C. 121 (2017) 5487-5497.

8) Polliotto V., Albanese E., **Livraghi S.***, Pacchioni G., Giamello E.,
"The photoactive nitrogen impurity in nitrogendoped zirconium titanate ($N\text{-}ZrTiO_4$): a combined electron paramagnetic resonance and density functional theory study"
Journal of Material Chemistry A. 5 (2017) 13062-13071.

9) Polliotto V., **Livraghi S.***, Krukowska A., Dozzi M.V., Zaleska-Medynska A., Selli E., Giamello E.,
"Copper-Modified TiO_2 and $ZrTiO_4$: Cu Oxidation State Evolution during Photocatalytic Hydrogen Production"
ACS Applied Materials and Interfaces 10 (2018) 27745−27756

10) Parrino F., **Livraghi S.**, Giamello E., Palmisano L.,
"The Existence of Nitrate Radicals in Irradiated TiO_2 Aqueous Suspensions in the Presence of Nitrate Ions"
Angewandte Chemie-International Edition. 57 (2018) 10702-10706.

11) Polliotto V., **Livraghi S.**, Giamello E.,
"Electron magnetic resonance as a tool to monitor charge separation and reactivity in photocatalytic materials"
Research on Chemical Intermediates 44 (2018) 3905-3921.

12) Polliotto, V., **Livraghi, S.**, Agnoli, S., Granozzi, G., Giamello, E.
Reversible adsorption of oxygen as superoxide ion on cerium doped zirconium titanate
Applied Catalysis A: Genera l580 (2019) 140-148.

13) Livraghi, S., Paganini, M.C., Giamello, E., Di Liberto, G., Tosoni, S., Pacchioni, G.
Formation of Reversible Adducts by Adsorption of Oxygen on Ce-ZrO_2: An Unusual η^2 Ionic Superoxide
Journal of Physical Chemistry C 123 (2019). 27088-27096

14) Chiesa, M., Giamello, E., **Livraghi, S.**, Paganini, M.C., Polliotto, V., Salvadori, E.
Electron magnetic resonance in heterogeneous photocatalysis research
Journal of Physics Condensed Matter 31(2019) 444001

15) Polliotto, V., Albanese, E., **Livraghi, S.**, Agnoli, S., Pacchioni, G., Giamello, E.
Structural, electronic and photochemical properties of cerium-doped zirconium titanate
Catalysis Today 340 (2020) 49-57

16) Chiesa, M., **Livraghi, S.**, Paganini, M.C., Salvadori, E., Giamello, E.
Nitrogen-doped semiconducting oxides. Implications on photochemical, photocatalytic and electronic properties derived from EPR spectroscopy
Chemical Science 11 (2020) 6623-6641

17) Parrino, F., **Livraghi, S.**, Giamello, E., Ceccato, R., Palmisano, L.
Role of Hydroxyl, Superoxide, and Nitrate Radicals on the Fate of Bromide Ions in Photocatalytic TiO_2 Suspensions.
ACS Catalysis 10 (2020) 7922-7931

18) Yurdakal, S., Çetinkaya, S., Augugliaro, V., Palmisano, G., Soria, J., Sanz, J., Torralvo, M.J., **Livraghi, S.**, Giamello, E., Garlisi, C.
Alkaline treatment as a means to boost the activity of TiO_2 in selective photocatalytic processes
Catalysis Science and Technology 10 (2020) 5000-5012

19) Zollo, A., Polliotto, V., **Livraghi, S.**, Giamello, E.
Self-Organisation of Copper Species at the Surface of Cu–TiO_2 Systems During H_2 Evolution Reaction: A Combined Investigation by EPR and Optical Spectroscopy.

Applied Magnetic Resonance 51 (2020) 1497-1513