

## PERSONAL INFORMATION

## Marco Zannotti



✉ marco.zannotti@unicam.it

### WORK EXPERIENCE

11/01/2014 – 10/07/2014

#### Visiting Researcher

University of Nottingham, School of Inorganic Chemistry, E. A. Gibson research group

- Optimization, production, study and characterization of p-type Solar Cells for their use in Tandem Solar Cell devices

01/07/2015 – in progress

#### Post-doc researcher, settore scientifico disciplinare CHIM/01-settore aggiuntivo CHIM/12, Area di ricerca 03 – Scienze Chimiche

University of Camerino, School of Science and Technology, Chemistry Division, Giovannetti research group.

Environmental Chemistry, Study on Solar Cells DSSC devices: optimization and characterization of nanomaterials semiconductor; water depuration by photocatalysis: optimization of novel semiconductor materials, "green" Graphene production, material Chemistry. Characterization of nanomaterials by UV-VIS, DRS, SEM, XRD, XPS, Raman techniques and Band-gap calculation.

Optimization and development of novel cellulose-based materials modified for pollutant adsorption and/or elimination by photocatalysis. Production and modification of cellulose based-material for pollutant adsorption and photocatalysis.

Studies and characterization of natural pigments like porphyrins and carotenoids by UV-Vis spectroscopy, identification and separation by HPLC-MS, kinetic and analytical studies concerning the aggregation- complexation process and acid-base features

Bio-remediation by Antarctic bacteria: purification and studies on secondary compounds by HPLC and Gas Chromatography.

### EDUCATION AND TRAINING

19/03/2012 – 19/03/2015

#### Ph.D. in "Chemical and Pharmaceutical Sciences And Biotechnology: Chemical Sciences"

University of Camerino – School of Advanced Studies

Ph.D. Thesis : "*Analytical approach to technologies for the environment: from wastewater aeration to energy production*"

- Aeration process, water depuration
- Adsorption and kinetic studies
- Preparation of nanomaterials and their electrochemical characterization
- Optimization of DSSCs and their characterization

15/12/2008 – 13/04/2011

#### Master Degree in Chemistry And Advanced Chemical Methodologies (Classe 62/S)

University of Camerino – School Of Science And Technology – Environmental Chemistry

Master Degree Thesis: "*Ottimizzazione dell'assorbimento di coloranti porfirinici su film nanoconduttori: uno studio cinetico e di equilibrio.*" **Final Mark: 110/110 with honors**

- Uv-vis characterization
- Adsorption and kinetic studies on natural pigments

6/10/2005 – 15/12/2008

#### Bachelor Degree in Chemistry (Classe 21)

University of Camerino – School Of Science And Technology – Chemistry Division

Bachelor Degree Thesis : "*Studio delle proprietà coordinative di leganti precarbonici derivati da liquidi ionici a base di imidazoli e triazoli N-alchilati*" **Final Mark: 110/110 with honors**

- Inorganic Synthesis and Coordination chemistry

2001-2005

**Diploma di Maturità Scientifica** Liceo Scientifico V.Volterra Fabriano- Final Mark 100/100

**PERSONAL SKILLS**

**Mother tongue(s)** Italian

**Other language(s)**

	UNDERSTANDING		SPEAKING		WRITING
	Listening	Reading	Spoken interaction	Spoken production	
<b>English</b>	C1	C1	C1	C1	C1
<b>French</b>	A2	A2	A2	A1	A1

Levels: A1/2: Basic user - B1/2: Independent user - C1/2 Proficient user  
Common European Framework of Reference for Languages

**Communication skills**

- Good communication skills gained through my experience in the laboratory teams at University of Camerino and Nottingham;

**Organisational / managerial skills**

- Good work planning;
- Prone to teamwork and cooperation;
- Analytical and methodical approach ;

**Job-related skills**

- Experience in oxygenation for wastewater depuration;
- Development and production of DSSCs solar cells devices with electrochemical characterization by JV curve and Cyclic Voltammetry.
- Development and production of novel semiconductor nanomaterial and their use in water depuration by Photo-catalysis with TiO<sub>2</sub>;
- Development on green method for the synthesis of reduced graphene oxide and metal nanoparticles.
- Band-Gap calculation by Kubelka-Munk plot and deconvolution of spectroscopic data.
- Experience in the use of Raman Horiba Instrumentation of UNICAM for the characterization of materials.
- Experience on characterization of natural pigments by UV-Vis, HPLC, complexation and kinetic studies.
- Production and modification of cellulose based-material for pollutant adsorption and photocatalysis.
- Good Knowledge of the following characterization techniques:
  - UV-vis Spectrophotometry;
  - Fluorescence Spectrophotometry.
  - Scanning Electron Microscopy;
  - Gas Chromatography;
  - X-Ray Diffraction ;
  - Solar Simulator and charge studies for Solar Cells;
  - Morphological Analysis ;
  - BET;
  - Raman Analysis;
  - ICP-MS;
  - HPLC
  - Microwave mineralization

**Computer skills**

- Good knowledge on Windows® Operating System;
- Good knowledge of Origin Software.
- Good knowledge of Office Software
- Fitting and deconvolution of curve by specific software.

**Other Skills**

**Culture della materia** for the teachings: Environmental Chemistry.

**Review activity** for international scientific journal: Catalysts, Spectrochimica Acta Part A: Molecular and Biomolecular Spectroscopy, Scientific Reports, Science of Advanced Materials, Analytical Methods, Chemosphere

**Driving License**

Driving license B

**ADDITIONAL INFORMATION**
**PUBLICATIONS**

1. R. Giovannetti, **M. Zannotti**, L. Alibabaei, and S. Ferraro, *International Journal of Photoenergy*, 2014; Vol. 1; Pages: 1-9 **Equilibrium and kinetic aspects in the sensitization of monolayer transparent TiO<sub>2</sub> thin films with porphyrin dyes for DSSC applications**  
DOI: [10.1155/2014/834269](https://doi.org/10.1155/2014/834269)
2. R. Giovannetti, L. Alibabaei, **M. Zannotti**, S. Ferraro, L. Petetta, *The Scientific Journal*; 2013; Vol. 1; Pages: 1-9 **"HPLC-DAD-ESI/MS Identification of Light Harvesting and Light Screening Pigments in the Lake Sediments at Edmonson Point"** DOI: [10.1155/2013/741906](https://doi.org/10.1155/2013/741906)
3. **M. Zannotti**, R. Giovannetti, *Journal of Molecular Liquids* 211 (2015) 656–666, **Kinetic evidence for the effect of salts on the oxygen solubility using laboratory prototype aeration system.**  
DOI: [10.1016/j.molliq.2015.07.063](https://doi.org/10.1016/j.molliq.2015.07.063)
4. **M. Zannotti**, R. Giovannetti, C.A. D'Amato, E. Rommozzi, *Spectrochimica Acta Part A: Molecular and Biomolecular Spectroscopy*, 153 (2016) 22-29, **Spectroscopic studies of porphyrin functionalized multiwalled carbon nanotubes and their interaction with TiO<sub>2</sub> nanoparticle surface.**  
DOI: [10.1016/j.saa.2015.07.111](https://doi.org/10.1016/j.saa.2015.07.111)
5. **M. Zannotti**, Christopher J. Wood, Gareth H. Summers, Lee A. Stevens, Matthew R. Hall, Colin E. Snape, Rita Giovannetti, and Elizabeth A. Gibson, *ACS Appl. Mater. Interfaces*, 2015, 7 (44), pp 24556–24565 **Ni Mg mixed metal oxides for p-type dye-sensitized solar cells** DOI: [10.1021/acsami.5b06170](https://doi.org/10.1021/acsami.5b06170)
6. R. Giovannetti, C.A. D'Amato, **M. Zannotti**, E. Rommozzi, R. Gunnella, M. Minicucci, A. Di Cicco, *Scientific Reports* 5, Article number: 17801 (2015) **Visible light photoactivity of Polypropylene coated Nano-TiO<sub>2</sub> for dyes degradation in water.** DOI: [10.1016/j.saa.2015.07.111](https://doi.org/10.1016/j.saa.2015.07.111).
7. Giovannetti, R.; Rommozzi, E.; D'Amato, C.A.; **Zannotti, M.** **Kinetic Model for Simultaneous Adsorption/Photodegradation Process of Alizarin Red S in Water Solution by Nano-TiO<sub>2</sub> under Visible Light.** *Catalysts* 2016, 6, 84. DOI: [10.3390/catal6060084](https://doi.org/10.3390/catal6060084)
8. Giovannetti, R.; Rommozzi, E.; **Zannotti, M.**; D'Amato, C.A.; Ferraro, S.; Cespi, M.; Bonacucina, G.; Minicucci M.; Di Cicco, A. **Exfoliation of graphite into graphene in aqueous solution: an application as graphene/TiO<sub>2</sub> nanocomposite to improve visible light photocatalytic activity.** *RSC Advances* 2016, 6, 93048-93055. DOI: [10.1039/C6RA07617C](https://doi.org/10.1039/C6RA07617C)
9. Giovannetti, R.; Rommozzi, E.; **Zannotti, M.**; D'Amato, C. A. *Catalysts*, 2017, 7, 305 **Recent advances on Graphene based TiO<sub>2</sub> Nanocomposites (GTiO<sub>2</sub>Ns) for Photocatalytic Degradation of Synthetic Dyes.** doi: [10.3390/catal7100305](https://doi.org/10.3390/catal7100305)
10. **Zannotti, M.**; Giovannetti, R.; Minofar, B.; Řeha, D.; Plačková, L.; D'Amato, C.A.; Rommozzi, E.; V. Dudko, H; Kari, N. *Spectrochimica Acta Part A: Molecular and Biomolecular Spectroscopy*, 133 (2018) 235-248 **Aggregation and metal-complexation behaviour of THPP porphyrin in ethanol/water solutions as function of pH.** <https://doi.org/10.1016/j.saa.2017.12.021>
11. D'Amato, C.A.; Giovannetti, R., **Zannotti, M.**; Rommozzi, E.; Ferraro, S.; Seghetti, C.; Minicucci, M.; Gunnello, R.; Di Cicco, A. *Applied Surface Science* 441 (2018) 575-587 **Enhancement of visible-light photoactivity by polypropylene coated plasmonic Au/TiO<sub>2</sub> for dye degradation in water solution** <https://doi.org/10.1016/j.apsusc.2018.01.290>
12. D'Amato, C.A.; Giovannetti, R., **Zannotti, M.**; Rommozzi, E.; Ferraro, S.; Minicucci, M.; Gunnello, R.; Di Cicco, A. *Nanomaterials*, 2018, 9, 599 **Band Gap Implications on Nano-TiO<sub>2</sub> Surface Modification with Ascorbic Acid for Visible Light-Active Polypropylene Coated Photocatalyst.** doi: [10.3390/nano8080599](https://doi.org/10.3390/nano8080599).
13. Rommozzi, E.; **Zannotti, M.**; Giovannetti, R.; D'Amato, C.A.; Ferraro, S.; Minicucci, M.; Gunnella, R.; Di Cicco, A. *Catalysts*, 2018, 8, 598 **Reduced Graphene Oxide/TiO<sub>2</sub> Nanocomposite: From Synthesis to Characterization for Efficient Visible Light Photocatalytic Applications.** doi: [10.3390/catal8120598](https://doi.org/10.3390/catal8120598)
14. **Zannotti, M.**; Benazzi, E.; Stevens, L. A.; Minicucci, M.; Bruce, L.; Snape, C. E.; Gibson, E. A.; Giovannetti, R.; *ACS Appl. Energy Mater*, 2019, 2,10, 7345-7353 **Reduced Graphene Oxide-NiO Photocathodes for p-Type Dye-Sensitized Solar Cells.** <https://doi.org/10.1021/acsaem.9b01323>

**Research projects participation**

15. **Zannotti, M.**; Rossi, A.; Giovannetti, R.; *Coatings* 2020, 10(3), 288 **SERS activity of silver nanosphere, triangular nanoplates, hexagonal nanoplates and quasi-spherical nanoparticles: effect of shape and morphology.** <https://doi.org/10.3390/coatings10030288>

16. **Zannotti, M.**; Vicomandi, V.; Rossi, A.; Minicucci, M.; Ferraro, S.; Petetta L.; Giovannetti, R.; *Journal of Molecular Liquids*, 2020, 309, 113238 **Tuning of hydrogen peroxide etching during the synthesis of silver nanoparticles. An application of triangular nanoplates as plasmonsensors for Hg<sup>2+</sup> in aqueous solution** <https://doi.org/10.1016/j.molliq.2020.113238>

17. Gigliobianco, M. R.; Campisi, B.; Peregrina, D. V.; Censi, R.; Khamitova, G.; Angeloni, S.; Caprioli, G.; **Zannotti, M.**; Ferraro, S.; Giovannetti, R.; Angeloni, C.; Lupidi, G.; Pruccoli, L.; Tarozzi, A.; Voinovich, D.; Di Martino, P. *Antioxidants* 2020, 9, 370 **Optimization of the Extraction from Spent Coffee Grounds Using the Desirability Approach** doi:10.3390/antiox9050370

**Master**

**FAR 2015-2017: NAMES** Nanocomposite Materials for Energy and environment applicationS, University of Camerino. Development of nano-semiconductor based on graphene material for water depuration by photocatalysis and solar cells, with the synthesis of reduced Graphene Oxide by green methodologies.

Master "ESPERTO AMBIENTALE", TuttoAmbiente, Bologna 14 October- 2 December 2016.

**Presentations**

Speaker at **Salone Europeo della Ricerca di Trieste** (26-28 September 2014) with the talk :

**MASSIMIZZARE L'ENERGIA ACQUISITA DA NANOPARTICELLE:SOLE, COLORE E NANOMATERIALI = ENERGIA.**

**Conferences and  
Poster presentations**

**ISOC 2013, 9th International School of Organometallic Chemistry**, 30<sup>th</sup> August- 3<sup>th</sup> September 2013, Camerino (MC), **Sensitization of monolayer transparent TiO<sub>2</sub> thin films with metal-porphyrin dyes for DSSC applications. Equilibrium and kinetic aspects.** **M. Zannotti**, C. A. D'Amato, R. Giovannetti. <http://hdl.handle.net/11581/287030>

**International Conference on Diamond and Carbon Materials**, 2-5 September 2013, Riva del Garda (TN), **Interaction of Porphyrins with Carbon Nanotubes**, **M. Zannotti**, R. Giovannetti, R. Gunnella, L. Petetta, S. Ferraro. <http://hdl.handle.net/11581/287031>

**XXIV Congresso della divisione di Chimica Analitica**, 15-19 September, Sestri Levante (GE), **Oxygen transfer in a gas-liquid system : kinetic influence of water salinity** , **M. Zannotti**, R. Giovannetti, S. Ferraro, S. Piccinini, ISBN 9788890767012. <http://hdl.handle.net/11581/361186>

**FNMA '14**, 1-5 September 2014, Camerino (MC), **Porphyrins functionalized MWCNTs and their interaction with TiO<sub>2</sub> nanoparticles surface.** R. Giovannetti, **M. Zannotti**, C. A. D'Amato, E. Rommozzi, S. Ferraro, ISBN 978-83-937979-0-5. <http://hdl.handle.net/11581/361186>

**FNMA '14**, 1-5 September 2014, Camerino (MC), **Characterization and environmental application of Polypropylene coated nano-TiO<sub>2</sub> in wastewaters**, R. Giovannetti, C. A. D'Amato, E. Rommozzi, **M. Zannotti**, M. Minicucci, R. Gunnella, ISBN 978-83-937979-0-5. <http://hdl.handle.net/11581/361183>

**4th Scientific Day of the School of Science and Technology**, 11<sup>th</sup> June 2014, Camerino (MC), **Optimization of Photocathode for Tandem-Dye Solar Cell**, **M. Zannotti**, E. Gibson, R. Giovannetti, C. Wood, G. Summers ISBN: 9788867680177. <http://hdl.handle.net/11581/327985>

**4th Scientific Day of the School of Science and Technology**, 11<sup>th</sup> June 2014, Camerino (MC), **Optimization of Photocathode for Tandem-Dye Solar Cell**, **M. Zannotti**, M. Zannotti; R. Giovannetti; S. Ferraro; S. Piccinini ISBN: 9788867680177. <http://hdl.handle.net/11581/327984>

**SPEA 8, 8<sup>th</sup> European Meeting on Solar chemistry and Photocatalysis: environmental applications**, 25-28 June 2014, Thessaloniki, Greece. **Visible light photoactivity of polypropylene coted Nano-TiO<sub>2</sub> for dyes degradation**, C. A. D'amato, E. Rommozzi, **M. Zannotti**, R. Giovannetti. <http://hdl.handle.net/11581/327981>

**SPEA 8, 8<sup>th</sup> European Meeting on Solar chemistry and Photocatalysis: environmental applications**, 25-28 June 2014, Thessaloniki, Greece. **Kinetic Model of photocatalytic Degradation of Alizarin Red-S Polypropylene coated nano-TiO<sub>2</sub>**, C. A. D'amato, E. Rommozzi, **M. Zannotti**, R. Giovannetti, S. Ferraro. <http://hdl.handle.net/11581/327982>

**XXV Congresso Nazionale di Chimica Analitica**, 7-12 September 2014, Arcavacata di Rende, **Equilibrium and kinetic aspects in photoactivity of Polypropylene coated Nano-TiO<sub>2</sub>**.  
C. A. D'Amato, E. Rommozzi, **M. Zannotti**, R. Giovannetti. <http://hdl.handle.net/11581/360981>

**GraphITA 2015**, 14-18 September 2015, Bologna, **Graphene/TiO<sub>2</sub> Nanocomposite for Efficient Visible-Light Photocatalysis: Synthesis, Characterization and Photocatalytic Applications**. E. Rommozzi, R. Giovannetti, **M. Zannotti**, C. A. D'Amato, S. Ferraro, M. Minicucci. <http://hdl.handle.net/11581/392138>

**5<sup>th</sup> Scientific Day of School of Science and Technology, UNICAM 2016**, 08 June 2016, Camerino (MC), **From TiO<sub>2</sub> and Graphite to Graphene doped TiO<sub>2</sub> for photocatalytic applications**.  
E. Rommozzi, R. Giovannetti, **M. Zannotti**, C. A. D'Amato, S. Ferraro, M. Minicucci, M. Cespi, G. Bonacucina, A. Di Cicco. ISBN: 9788867680269. <http://hdl.handle.net/11581/391701>

**6<sup>th</sup> Scientific Day of School of Science and Technology, UNICAM 2016**, 28 September 2018, Camerino (MC), **Graphene doped nickel oxide for solar conversion**. **M. Zannotti**, R. Giovannetti, C.A. D'Amato, E. Rommozzi, R. Gunnella, M. Minicucci, A. Di Cicco, E.A. Gibson, L. Bruce ISBN: 9788867680368

**XXVIII Congresso della divisione di Chimica Analitica**, 22-26 September 2019, Bari, **Silver nanoparticles plasmonic sensor for the detection of mercury ions (Hg<sup>2+</sup>) in aqueous medium**, **M. Zannotti**, R. Giovannetti, S. Ferraro ISBN: 978-88-94952-10-0 ©Società Chimica Italiana 2019

**20th CIRIAF National Congress Sustainable Development, Human Health and Environmental Protection**, 16-17 April 2020, Perugia, **Temperature and salinity effects on the Raman OH-stretching vibration bands of water: starting point to know hydrate occupancy and unreacted water in the gas hydrates**, A.Rossi, M. Minicucci, **M. Zannotti**, F. Nobili, A. Di Cicco, R. Giovannetti

**20th CIRIAF National Congress Sustainable Development, Human Health and Environmental Protection**, 16-17 April 2020, Perugia, **Chemical characterization of water present in the natural marine sediment samples containing gas hydrates**, A.Rossi, S. Ferraro, L. Petetta, **M. Zannotti**, R. Giovannetti

## Seminars

**"FREE HPLC/UHPLC Method Development Seminar"**, Phenomenex; Bologna 11<sup>th</sup> October 2011.

**"Web Training@Unicam2012"**, University of Camerino, Camerino, 16-17-19-20 July, 2012.

**"English for writing research papers"**, University of Camerino, Camerino, 18-19-20 June, 2012.

**"Communication of science to public", part 2 – how to write a scientific article for the general public**, University of Camerino, 28<sup>th</sup> June.

**"International Conference on Perovskite Solar Cells and Optoelectronics (PSCO-2015)"** Lausanne, Switzerland, between the 27<sup>th</sup> to 29<sup>th</sup> September 2015.

**"Materials for Sodium-ion batteries"**, University of Camerino, 03<sup>th</sup> March 2016.

**7° CORSO NAZIONALE DI INTRODUZIONE ALLA FOTOCHIMICA**, University of Bologna, 06-10 June 2016.

## Teaching activity

Contract professor

2014 → 2020

A.A. 2014/2015

[ST0105] ENVIRONMENTAL CHEMISTRY (GEOENVIRONMENTAL RESOURCES AND RISKS)

A.A. 2015/2016

[ST0105] ENVIRONMENTAL CHEMISTRY (GEOENVIRONMENTAL RESOURCES AND RISKS)

A.A. 2016/2017

[ST0192] ENVIRONMENTAL CHEMISTRY AND LABORATORY (CHEMISTRY AND ADVANCED CHEMICAL METHODOLOGIES)

[ST0105] ENVIRONMENTAL CHEMISTRY (GEOENVIRONMENTAL RESOURCES AND RISKS)

A.A. 2017/2018

[ST0105] ENVIRONMENTAL CHEMISTRY (*GEOENVIRONMENTAL RESOURCES AND RISKS*)

A.A. 2018/2019

[ST0105] ENVIRONMENTAL CHEMISTRY (*GEOENVIRONMENTAL RESOURCES AND RISKS*)

A.A. 2019/2020

[ST0105] ENVIRONMENTAL CHEMISTRY (*GEOENVIRONMENTAL RESOURCES AND RISKS*)

**Co-Supervisor of Master and Bachelor's Degree's**

**2013→2020**

ANNEXES

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