

Mark A. Bajada

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Education & Research

University of Cambridge, Department of Chemistry (Jan 2016 – April 2020)

Ph.D. Researcher

Thesis: Electrochemical and Photocatalytic Flow Strategies for Sustainable Substrate Oxidation (supervisor: Prof. Erwin Reisner)

- Investigated design strategies and immobilisation techniques for carbon nitride-based, visible light-driven photocatalysis under continuous flow; involved the use of CFD and hands-on photoreactor prototyping.
- Synthesis and development of a novel hybrid anode, featuring a silatrane-modified TEMPO catalyst covalently immobilised on a metal oxide scaffold. The performance of the assembled anode was optimised towards the electro-oxidation of representative biomass substrates, and then integrated with a precious-metal-free CO₂ reduction electrocatalyst, for coupled alcohol oxidation and CO₂-to-syngas conversion.

University of Cambridge, Department of Engineering (Sep 2013 – Sep 2014)

MPhil in Energy Technologies (**Distinction**)

Thesis: Analysis of Catalytic Nanoparticles, as Adopted in the Floating CVD Synthesis of Carbon Nanotubes

- Development of a technique to extract nanoparticles directly from the synthesis zone of the tube furnace reactor for in situ and ex situ characterisation, to devise correlations between operational parameters and nanoparticulate formation and chemical structure.

University of Malta, Faculty of Science (Sep 2009 – July 2013)

BSc (Hons) Chemistry and Physics (**First Class**)

Thesis: Modelling Negative Thermal Expansion via Rigid Unit Modes: an Analytical Approach

Commercial & Teaching Experience

EIT Climate-KIC | *Pioneers into Practice* programme (June 2020 – November 2020, Malta & Italy)

- Supported by the European Institute of Innovation and Technology (EIT), the programme involved: i) **e-learning modules** and workshops related to **system innovation** and **climate change**, ii) a **techno-economic group challenge** with a local host, iii) a 6-week placement with a commercial, government or academic enterprise on a climate-related topic.
- Placement conducted with Dr. Fabrizio Passarini at the Interdepartmental Centre for Industrial Research “Renewable Resources, Environment, Sea and Energy”, University of Bologna. Aim of placement: to adopt the life cycle assessment methodology to estimate the environmental performance and “degree of sustainability” of the photoreforming process of plastic waste to generate H₂ fuel.

TreeLife (startup) | *Founder* (Jan 2016 – Dec 2016, UK)

- **Pioneered, coordinated and launched** a platform (www.treelife.co) to raise awareness about our **personal CO₂ footprint** and society’s role to play in tackling climate change.

Innovative Technology and Science Ltd. | *Innovation Consultant* (April 2015 – Dec 2015, UK)

- **Authored** interdisciplinary proposals (H2020 Phase 1 & 2 SMEi, FTI) for high impact collaborative R&D projects.
- Assisted with the generation of ideas to create innovative concepts and solutions for our clients, and carried out due diligence **market research & techno-economic feasibility** studies of the resulting ideas.
- **Communicated** effectively with technical staff, industrial clients, and research partners.

Private Tuition (July 2010 – September 2013, Malta)

- One-on-one and small group tuition classes on: Chemistry, Physics, Mathematics (GCSE and Advanced level).

Relevant Skills

<i>Research skills & scientific expertise</i>	Highly multidisciplinary and technical background , experimental design and hands-on work carried out in chemistry and engineering laboratories, handled and analysed large volumes of experimental data, conducted broad literature reviews. Specific skills include: <ul style="list-style-type: none">- Multiphase, continuous flow reactor design and assembly (packed column, thin channel, PDMS microfluidic devices).- Rapid prototyping using 3D printing techniques (material extrusion and photopolymerisation).- Electrochemistry: analysis of molecular species and semiconductors, heterogeneous electrocatalysis.- Molecular synthesis and material fabrication: catalyst design, catalyst deposition and immobilisation methods, Schlenk techniques, thermal polymerisation, electrodeposition, metal oxide (electrode) nanostructuring.- Analytical techniques: solvent suppression NMR, GC, HPLC.- Characterisation techniques: NMR spectroscopy, XPS, XRD, FTIR, SEM, spectroelectrochemistry.- Computational techniques: numerical modelling, CFD.
<i>Project management & team player</i>	Lead on highly interdisciplinary research projects: initiated and managed interdisciplinary and collaborative projects with other labs in UK and Germany during my PhD, to apply novel analytical and material fabrication techniques to innovative research questions.
<i>Business & innovation</i>	<ul style="list-style-type: none">- Cofounded the start-up company 'TreeLife' during the first year of my PhD.- Formed part of the innovation team working with the RTD organisation TWI to develop the concept and business plan for the 'CMDrive project' (Condition Monitoring of Wind Turbine Drive-Trains via Non-Contact Acoustic Sensors), which secured over €2 million in H2020 funding (grant agreement ID: 701002).
<i>Communication & networking</i>	<ul style="list-style-type: none">- <i>Excellent written and verbal communication skills</i>: disseminated and communicated ideas and research results through peer-reviewed publications ((co)-authored 6 publications, 1 in preparation, Google Scholar), conference presentations (2 oral presentations and 6 poster presentations at international conferences), theses, techno-economic proposals; confident public speaker and enjoy presenting to a wide audience.- <i>Languages</i>: English, Maltese (bilingual), French (A1 proficiency).
<i>IT, software & programming</i>	<ul style="list-style-type: none">- <i>Programming using MATLAB</i> (8+ years experience): data analysis, modelling, and optimisation routines. Understanding of Python and finite element modelling software COMSOL Multiphysics.- High proficiency in use of Microsoft Office-Suite.- Experience with vector graphics design programs (Adobe Illustrator), AutoCAD, and 3D rendering software (SolidWorks, Autodesk Inventor).

Scholarships & Awards

- **Christian Doppler Research grant** (supported by O&G company OMV) provided during my doctoral studies (2017 – 2020).
- **Endeavour Scholarship** for doctoral research (2016 – 2020) awarded by Malta's Ministry for Education.

- **'Master it' Scholarship** (2013 – 2014) awarded by Malta's Ministry for Education.
- Robed during the bachelor graduation ceremony (highest grade in Faculty of Science: 91%).
- **BOV Special Prize for Science** (2014).
- Four-time consecutive winner of the **Dean of Science Awards** for outstanding performance (2010 – 2014).

Selected Publications

Uekert, T.; **Bajada, M.A.**; Schubert, T.; Pichler, C. M.; Reisner, E. 'Scalable Photocatalyst Panels for Photoreforming of Plastic, Biomass and Mixed Waste in Flow', *ChemSusChem*. 10.1002/cssc.202002580.

Bajada, M.A.; Roy, S.; Warnan, J.; Abdiaziz, K.; Wagner, A.; Roessler, M.M.; Reisner, E. 'A Precious-metal-free Hybrid Electrolyzer for Alcohol Oxidation Coupled to CO₂-to-syngas Conversion', *Angew. Chem. Int. Ed.* **2020**, *59*, 15633 –15641.

Bajada, M.A.; Vijeta, A.; Savateev, A.; Zhang, G.; Howe, D.; Reisner, E. 'Visible-Light Flow Reactor Packed with Porous Carbon Nitride for Aerobic Substrate Oxidations', *ACS Appl. Mater. Interfaces* **2020**, *12*, 8176-8182.

Andrei, V.; Hoye, R. L. Z.; Crespo-Quesada, M.; **Bajada, M.A.**; Ahmad, S.; De Volder, M.; Friend, R.; Reisner, E. 'Scalable Triple Cation Mixed Halide Perovskite–BiVO₄ Tandems for Bias-Free Water Splitting', *Adv. Energy Mater.* **2018**, *8*, 1801403.

Selected Academic Presentations & Posters

Faraday Discussions on Artificial Photosynthesis, 2019 (Cambridge, UK) – Poster Presentation

Cambridge Chemistry Showcase, 2018 (Cambridge, UK) – Oral Presentation

6th UK Solar Fuels Network Symposium, 2018 (York, UK) – Poster Presentation

EPFL Winter School on the Challenges & Opportunities in Energy Research, 2018 (Crans-Montana, Switzerland); *Travel Grant Awarded by the Department of Chemistry, University of Cambridge* – Poster Presentation

International Aerosol Conference, 2014 (Busan, South Korea) – Contribution to Oral Presentation

Certificates

- PADI Advanced Open Water Diving certificate (September 2020).
- TEFL qualification to teach English to foreign students (February 2012).

Referees

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