WORK EXPERIENCE

(from August 2020 – to July 2021)

Research fellow

Centro di Studi sulla Corrosione e Metallurgia "Aldo Daccò" - Università degli Studi di Ferrara

Supervisors: Prof. Cecilia Monticelli, Prof. Andrea Balbo

- The research activity was mainly related to i) ERDF Project "IMPReSA" and ii) JPICH Project "PROCRAFT". For ERDF Project the candidate performed electrochemical characterizations in order to investigate corrosive phenomena in different concrete samples, composed in part of recycled plastic materials or BioCHAR (charcoal), usable in the construction and infrastructure sectors, through potentiostatic measurements, potentiometric titrations and electrochemical impedance spectroscopy analyses (EIS). Furthermore, the characterization was supplemented by FT-IR spectroscopy, optical microscopy analysis and electron microscopy analyses performed with a scanning electron microscope (SEM). For JPICH Project the candidate performed electrochemical tests concentrating particularly on the preservation of aluminium alloy components, in order to create innovative procedure and solutions for different key step in WWII aircraft conservation such as bio-based smart coatings for outdoor protection, respecting the requirements of cultural heritage. The electrochemical characterization was performed by potentiostatic measurements, potentiometric titrations and EIS analyses. The innovative protective coatings developing was based on silane, polyactide and cutin coatings (extracted from tomato). Furthermore, the characterization was supplemented by FT-IR spectroscopy, NMR spectroscopy, optical microscopy analysis and SEM analysis.

Sector Scientific Research

(from August 2019 – to July 2020)

Research fellow

TekneHub laboratory, Università degli Studi di Ferrara

Supervisor: Prof. Michele Bottarelli

- The research activity was dedicated to the ERDF Project "CLIWAX" and the Horizon 2020 Project "IDEAS". The candidate focused on the geothermal application of Phase Change Materials (PCMs) by carrying out numerous experimental analyses and laboratory tests on the compliant technologies in order to increase the thermal energy storage efficiency of a full-scale plant that was realized in the meantime and in which the candidate was actively involved. Additionally, in support of the experimental tests the candidate implemented numerous numerical simulations using COMSOL Multiphysics software. Furthermore, the candidate learned how to deal with the administrative and bureaucratic side of the research activity.

Sector Scientific Research

(from September 2013 – to 2019)

Private lessons of Chemistry, Physics and Mathematics

- The candidate gave private lessons to High School as well as University students of Economy, Biology and Chemistry Departments.

EDUCATION AND TRAINING

(from September 2015 – to March 2019)

Master degree in Chemical Sciences, 107/110

Università degli Studi di Ferrara

Thesis title: "Proton-coupled electro-transfer in supramolecular adducts based on Sn(IV) porphyrins and redox-active amino acidic residues".

Supervisor: Prof. Mirco Natali

- During the period of his thesis, the candidate acquired good knowledge in spectroscopic techniques such as stationary and time-resolved absorption and emission, using spectrophotometers, spectrofluorometers, nanosecond laser and TC-SPC equipment. He acquired great knowledge in the use of voltammetric techniques for the characterization of organometallic complexes.

(from September 2011 – to March 2015)

Bachelor degree in Chemistry

Università degli Studi di Ferrara

Thesis title: "L'effetto antenna nella fotosintesi artificiale" ("The antenna complex in artificial photosynthesis").

Supervisor: Dr. Roberto Argazzi (C.N.R. Ferrara researcher)

- During the period of his thesis, the candidate acquired good knowledge in bibliographical research and the study of current photophysical techniques.

(from September 2005 – to July 2010)

High School Diploma

Liceo Classico "Ludovico Ariosto", Ferrara

PERSONAL SKILLS

Mother tongue: Italian

Other language

	UNDERSTANDING		SPEAKING		WRITING
	Listening	Reading	Spoken interaction	Spoken production	
English	C1	C1	B2	B2	C1

Levels: A1/A2: Basic user - B1/B2: Independent user - C1/C2 Proficient user
Common European Framework of Reference for Languages

Communication and organisational skills

- Since the University, the candidate developed excellent skills in working in teams as well as individually. His motivation allows him to manage stressful situations and to organize the workload, meeting the deadlines assigned, especially during his activity as research fellow, where he learned how to deal with the administrative and bureaucratic side of the research activity.

Digital skills

SELF-ASSESSMENT				
Information processing	Communication	Content creation	Safety	Problem solving
Proficient user	Proficient user	Proficient user	Proficient user	Proficient user

Levels: Basic user - Independent user - Proficient user

- Good command of office suite: Word, Excel, Power Point.
- Good command of data acquisition and analysis softwares: Spectrum 10, Omnic, AMR Wincontrol, Origin, PowerSuite, SAI CorrWare, SAI CView, SAI ZPlot, SAI ZView, COMSOL Multiphysics, FluoFit, PicoHarp 300, SmartSEM, Aztec Nanoanalysis, Varian NMR.

ADDITIONAL INFORMATION

Publications

- Francesco Barbieri*, Silvia Barbi, Simona Marinelli, Bianca Rimini, Sebastiano Merchiori, Michele Bottarelli, Monia Montorsi "Analysis of previous reviews on Phase Change Materials in the building sector, with a focus on ground coupled heat pumps". Energy & Buildings 2021 (submitted-on revision).
- Silvia Barbi*, Francesco Barbieri, Simona Marinelli, Bianca Rimini, Sebastiano Merchiori, Barbara Larwa, Michele Bottarelli, Monia Montorsi "Phase Change Material-sand for distributed latent heat thermal energy storage: interaction and performance analysis". Renewable Energy 2021, 169, 1066-1076.
- Mirco Natali*, Agnese Amati, Sebastiano Merchiori, Barbara Ventura and Elisabetta Iengo* "Photoinduced Proton-Coupled Electron Transfer in Supramolecular Sn^{IV} Di(L-tyrosinato) Porphyrin Conjugates". The Journal of Physical Chemistry C. 2020, 124, 16, 8514-8525.
- Michele Bottarelli, Sebastiano Merchiori "Paraffin-sand mixture to enhance underground thermal energy storage". WSSET Newsletter. Volume 11, Issue 3, July 2019.

Conferences

- Federica Zanotto, Alice Sirico, Sebastiano Merchiori, Francesca Vecchi, Andrea Balbo, Patrizia Bernardi. Beatrice Belletti, Alessio Malcevschi, Vincenzo Grassi, Ceciclia Monticelli "Durabilità di calcestruzzi armati contenenti Biochar e plastica da riciclo". Giornate Nazionali sulla Corrosione e Protezione – AIM 2021. Abstract accepted.
- Silvia Barbi, Francesco Barbieri, Simona Marinelli, Barbara Larwa, Bianca Rimini, Sebastiano Merchiori, Michele Bottarelli, Monia Montorsi "Materials characterization and thermal analysis of PCM-silica mixtures for back-filling of ground heat exchangers". EM4SS 2021. Abstract accepted
- Federica Zanotto, Alice Sirico, Sebastiano Merchiori, Francesca Vecchi, Andrea Balbo, Patrizia Bernardi. Beatrice Belletti, Alessio Malcevschi, Vincenzo Grassi, Ceciclia Monticelli "Durability of reinforced concretes containing biochar and recycled polymers". EM4SS 2021. Abstract accepted
- Federica Zanotto, Alice Sirico, Francesca Vecchi, Andrea Balbo, Patrizia Bernardi, Beatrice Belletti, Alessio Malcevschi, Vincenzo Grassi, Sebastiano Merchiori, Cecilia Monticelli "Durability of reinforced concrete containing biochar". CACRS 2020. Conference Paper.
- Federica Zanotto, Alice Sirico, Andrea Balbo, Francesca Vecchi, Patrizia Bernardi, Ceciclia Monticelli Alessio Malcevschi, Vincenzo Grassi, Sebastiano Merchiori, Beatrice Belletti "Resistenza a corrosione e proprietà meccaniche di un nuovo calcestruzzo armato contenente Biochar". Giornata di Studio "Pietro Pedeferri" 2020. Abstract accepted.
- Federica Zanotto, Sebastiano Merchiori, Vincenzo Grassi, Andrea Balbo, Ceciclia Monticelli "IMPReSA-Impiego di Materiali Plastici da Riciclo per malte e calcestruzzi Strutturali Alleggeriti". Remtech Expo 2020.
- Michele Bottarelli, Sebastiano Merchiori "Role of phase change materials in backfilling material of shallow ground heat exchangers". International Conference on Sustainable Energy and Technologies-SET2020. Abstract accepted.
- Barbara Larwa, Sebastiano Merchiori, Marco Cavazzuti, Michele Bottarelli "Thermal properties investigation of backfill materials with PCM for shallow ground heat exchangers applications". 38th International Conference on Heat and Mass Transfer-UIT2020. Abstract accepted.

Projects

- JPICH Project-PROCRAFT " Protection and Conservation of Heritage Aircraft"
- ERDF Project-IMPReSA "Valutazione del comportamento a corrosione di armature di rinforzo in calcestruzzi alleggeriti" ("Evalutation of the corrosion behaviour of reinforcing bars in lightened concrete").
- ERDF Project-CLIWAX "Materiali a cambio di fase per l'harvesting energetico in climatizzazione" ("Phase change materials for energy harvesting in air conditioning").
- HORIZON2020 Project-IDEAS "Novel building integration designs for increased efficiencies in advanced climatically tunable renewable energy systems".

Presentations

- CLIWAX Project-SOA "Status meeting-TekneHub lab.", 08/07/2020.
- Breakthrough in ground thermal application-short seminar "PCMs coupling with ground heat exchangers (CLIWAX Project),18/02/2020.
- CLIWAX Project-SOA "Test preliminari sull'efficacia dell'abbinamento di PCM nel suolo" ("Preliminary tests on the effectiveness of PCMs-ground combination"), 29/11/2019.
- CLIWAX Project-KOM "Kick off meeting-TekneHub lab." 01/07/2019.

Seminars

- "Atomostic modelling of corrosion inhibitors"-CorroZoom, 09/06/2021.
- "A Framework for Pitting Corrosion Base on Pit Growth Stability"-CorroZoom, 09/04/21.
- "Corrosion of Additive Manufactured Materials"-CorroZoom, 24/02/2021.
- "Thermal Analysis and Calorimetry for the Characterization of Batteries"-SETARAM Web seminar, 27/01/2020.

- "Characterization of Surface Oxidation and Corrosion Processes at the Nanoscale"-CorroZoom, 18/01/2020.
- "The characterization of hydrogen storage materials for energy storage/production"-SETARAM Web seminar, 24/09/2020.
- Heat capacity measurements by calorimetric techniques-SETARAM Web seminar "Episode 2: Heat capacity at high temperature", 04/06/2020.
- Heat capacity measurements by calorimetric techniques-SETARAM Web seminar "Episode 1: Heat capacity of solids", 19/05/2020.
- Breakthrough in ground thermal application-short seminar "PCMs coupling with ground heat exchangers (CLIWAX Project),18/02/2020.

Courses and Certifications

- Molecular Dynamics Simulations for Beginners using LAMMPS, 25-31/07/2021.
- Personal data security course "La nuova disciplina in tema di protezione dei dati personali", 30/03/2020.
- First level aid course "Corso Base di Primo Soccorso", 20/01/2020.
- Workplace safety course, medium risk "Corso di Sicurezza sul Lavoro, rischio medio", 13/06/2018.