Elie GEAGEA

Curriculum Vitae

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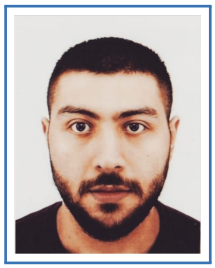

"The first step is to establish that something is possible; then probability will occur" - Elon MUSK

Education

2019–2022 **Ph.D in Condensed Matter and On-Surface Chemistry**, *University of Franche-Comté and Femto-st CNRS Laboratory*, France.

2016–2017 **Master 2 in Nanosciences and Functional Materials**, *Lebanese University – Faculty of science – Section 2*, Lebanon.
Rank – 2/9

2015–2016 **Master in General Physics**, *Lebanese University – Faculty of science – Section 2*, Lebanon.
Rank – 1/25

2012–2015 **Bechelor's degree in General Physics**, *Lebanese University – Faculty of science – Section 2*, Lebanon.
Rank – 1/70

Experience

PostDoctoral researcher

Title *Investigation of photoinduced chemical reactions on-surface of alkali-halide bulk insulators*

Supervisors Professor Christian LOPPACHER

Description This work aims to find on-surface chemical reactions enabling a controlled growth of organic covalent nanostructures, on the surfaces of Alkali-Halide single crystal bulk insulators (KCl, RbCl, NaCl, KBr), in ultra high vaccum (UHV) conditions. In fact, since organic precursors weekly adsorbs on insulators, UV-light sources are used to trigger the reactions and a non contact atomic force microscope (nc-AFM) to monitor the surface. Despite the inert caracter of the surface resulting in a lack of catalytical assistance to the reactions, today we are able to propose two successful reactional systems. The first allows the growth of 1µm long maleimide based 1D polymer throuigh an on-surface photoinduced radical polymeration reaction. The second allows the growth of 2D porous polymeric network of fantrip molecules via a photoinduced [4+4] cycloaddition reaction.

Ph.D Thesis

Title *On-surface chemical reactions studied by STM under UHV*

Supervisors Professor Frank PALMINO & Doctor Frédéric CHERIOUX

Description The thesis work investigates some on-surface chemical reactions under UHV. Three different reactions were studied. The first concerns thermally-induced fabrication of functional graphene nanoribbons on coinage metal surfaces (Cu(111) and Au(111)). The second study demonstrates the possibility to initiate a radical polymerisation reaction on a silicon semiconductor surface leading to the formation of 1D Alkane oligomers. The third work reports a facile dissociation of inert Nitrogen N_2 molecules on Si(111)-7x7 surface at room temperature and low pressure of the gas.

Master 2 Internship

Title *Graphene based materials deposited by «Electrospray» : applications for electrodes used in organic solar cell*

Supervisors Professor Doumit ZAOUK & Doctor Freddy KRASINSKI

Description The manufacturing of graphene-based electrodes for use in foldable solar cells was the focus of this internship project. Electrospray deposition of graphene oxide on glass substrates was used to create thin films with insulating and opaque properties. The thin layers were then reduced through thermal annealing under high vacuum conditions, resulting in a transparent and conductive material that can be used as electrodes.

Master 1 Internship

Title *Modeling of metal ablation by pulsed laser beam*

Supervisors Professor Joseph DGHEIM

Description To mimic the ablation of different metals such as copper and aluminum, a model based on the heat transfer equation was created utilizing several laser pulse profiles (Gaussian, Lorentzian, etc.). The suggested approach enables highly precise prediction in accordance with real data from experimental activity.

Title *Modeling and optimization of an electricity production system from renewable sources.*

Supervisors Doctor Toufic HALABI

Description The study's goal was to create a mechanism for gathering wind energy and using it to generate power. Modeling the system with multivariable mathematical equations allowed for design optimization to maximize the amount of electrical energy produced.

Publications

Accepted and published

Title *Collective Radical Oligomerisation Induced by STM tip on a Silicon Surface*

Reference Nanoscale 2021, 13 (1), 349–354

Title *Unravelling the Growth Mechanism of (3,1) Graphene Nanoribbons on a Cu(111) Surface*

Reference Chem. Commun. 2021, 57 (49), 6043–6045

Title *On-Surface Synthesis of Ligands to Elaborate Coordination Polymers on an Au(111) Surface*

Reference Nanomaterials 2021, 11 (8)

Title *On-surface reactivity of disubstituted-bianthryl molecules on Cu(111) and Au(111) surfaces*

Reference Solid State Sci. Technol. 2022, 11 (3)

Title *On-Surface Chemistry on Low-Reactive Surfaces*

Reference Chemistry 2022, 4 (3)

Title *Dissociation of N_2 on a Si(111)-7x7 surface at room temperature*

Reference ChemPhysChem 2023, 24 (15)

Title *Activation, Transportation, and Reaction of Alkyl Radicals on a Si(111)-B Surface by a Scanning Tunneling Microscope Tip*

Reference J. Phys. Chem. C 2023, 127 (12)

Title *Growth mechanism of chevron graphene nanoribbons on (111)-oriented coinage metal surfaces*

Reference Commun. Chem. 2023, 128 (21)

In Proceeding

Title *Photoinduced Modulation of the Oxidation State of Dibenzothiophene S-Oxide Molecules on an Insulating Substrate*

Reference Nat. Comm. 2025

Computer skills

Basic JAVA, Microsoft Visual Studio (C++)

Intermediate MATLAB, COMSOL, LaTeX, Labview

Advanced Microsoft Office: Word, Excel, and Powerpoint

Communication Skills

2024 Poster at OSS24 international conference - Spain

2024 Poster at Forum des Microscopie à Sondes Locales - France (Best Poster Award)

2023 Oral Presentation at GDR-NS-CPU - France

2023 Poster at Forum des Microscopie à Sondes Locales - France

2022 Poster at 747. WE-HERAEUS-SEMINAR - Germany

2022 Poster at OSS22 international conference - Spain

2022 Oral Presentation at ELECMOL international conference - France

2022 Poster at ELECMOL international conference - France

2022 Oral Presentation at Forum des Microscopie à Sondes Locales - France

Languages

Arabic **Mothertongue**

French **Advanced**

English **Advanced**

Interests

- Oud
- Cooking
- Basketball
- Mountain biking

References

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Professor Christian LOPPACHER
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