Ange A. **Maurice**

Post-doctoral Researcher

Madrid, Spain

+34666716223 | ange.maurice@pa.uc3m.es | ange-maurice | ORCID: 0000-0003-1282-857X

Research interests: *Characterisation, Python, Spectroscopy, Microfluidics, Chemistry, Prototyping*

Research and work experience

Universidad Carlos III de Madrid, Fluid Mechanics Department(Postdoc)

Madrid

2021-Now

Development of an online State of Charge measuring system for vanadium redox flow batteries using UV-Visible spectroscopy[1, 2]

- UV-Visible spectroscopy of vanadium electrolytes
- Development of calibration algorithms for measuring battery charge
- Establishment of a chemistry laboratory
- Viscosity and density measurements of vanadium electrolytes

Nanyang Technological University, SCARCE Laboratory(Postdoc)

Singapore

2018-2021

Development, maintenance and experimentation with a fully automated microfluidic platform for liquid-liquid extraction studies[4, 6, 7]

- Liquid-liquid extraction of metals and rare earths using synergistic extractant mixtures and deep eutectic solvents
- On-line X-ray fluorescence apparatus/measurements of metals
- On-line FTIR measurement of solvent chemical activity
- Hardware design of microfluidic chips
- Python programming for remote control of apparatus

Building an automated prototype for sorting waste printed circuit board (WPCB) components[3, 5]

- X-ray absorption spectroscopy for recognition of PCB components based on their chemical composition
- Image recognition of PCB components using deep learning: Convolutional neural networks
- Fully working prototype with sorting rate 3 kg/hr

Nanyang Technological University (PhD)

Singapore

2014-2018

Electrical breakdown of graphene transistors[8]

- Study of the physical mechanism
- Spatial control of the crack propagation using femtosecond laser annealing

Setting up a femtosecond laser optical apparatus

- Implementation of power control, imaging system, sample holder.
- LabView programming

Defect engineering by femtosecond laser annealing[10]

- Gallium nitride and hexagonal boron nitride: Single-photon and tunable light sources
- Graphene and Molybdenum disulphide: Gas sensors, electrical breakdown control

Non-volatile graphene memories based on electrical breakdown

- Study of the switching mechanism, new electro-mechanical switching model
- Optimisation of the memory (ON/OFF ratio, switching speed, endurance)

University of Rochester (Visiting PhD scholar)

Rochester, USA

Feb-Aug. 2016

Hybrid Carbon Hetero-Structures for Advanced Thermal Interface in 3D Interconnects[9]

- COMSOL electro-thermal simulation of carbon interconnects

École Polytechnique (Visiting PhD scholar)

Palaiseau, France

Oct-Dec. 2017

In-situ infrared thermography of graphene transistors[8]

- Real-time observation of the thermal dissipation in graphene transistors
- COMSOL electro-thermal simulation of graphene transistors

SAINT-GOBAIN Research Centre

Aubervilliers, France

Feb-Aug. 2014: 6 months

Research Internship: Study of optical thin films on glass

THALES Angénieux

St Héand, France

Jun-Sep. 2013: 3 months

Engineering Internship: Studying residual stresses in wrought aluminium

SOITEC — *Bernin, France*
Internship: R&D project, Improving efficiency of a solar cell — *Jul-Aug. 2012, 2 months*

University of the West of Scotland — *Paisley, Scotland*
Research internship: Oceanographic project on acoustic bubble sizing — *Apr-Jun. 2011, 3 months*

Education

Nanyang Technological University/CNRS-International-NTU-THALES Research Alliance — *Singapore*
Doctor of Philosophy (PhD): School of Electrical & Electronic Engineering — *2014-2018*
"Thermal failure analysis of carbon nanostructures" Supervised by Beng Kang Tay

Institut National des Sciences Appliquées (INSA) — *Lyon, France*
Master's degree : Materials Science and Engineering — *2011-2014*

Dublin City University (DCU) — *Dublin, Ireland*
Academic exchange: School of Mechanical and Manufacturing Engineering — *Sep. 2013-Jan. 2014*

Institut Universitaire de Technologie (IUT) — *Montpellier, France*
Two-years university diploma (DUT) in the Mesures physiques (Instrumentation and Measurement) department — *2009-2011*
Specialty : Materials science

Lycée Jean Monnet — *Montpellier, France*
Baccalauréat S (mathematics, physics,chemistry, biology) — *2009*

Skills

Programming	Python, VBA, MATLAB/Scilab, Labview, LaTeX
Softwares	COMSOL, Ansys, Blender, Microsoft Office, CAD drawing
Operating systems	Linux, Windows, Mac OS
Languages	English: Fluent, Spanish: Fluent, French: Native speaker
Experimental	**Characterization:** Atomic Force Microscope, Raman spectroscopy, Scanning Electron microscope, X-Ray scattering, X-ray Fluorescence, X-ray absorption, Electrical micro-probing, FTIR spectroscopy, UV-Visible Spectroscopy **Micro-fabrication:** Spin coating, UV Photolithography, Mask design, Lift-Off, Plasma etching **Deposition:** Magnetron sputtering, Filtered Cathodic Vacuum Arc, Electron-beam evaporation **Microfluidics:** Chip design and fabrication, on-line characterisation, 3D printing

Teaching

Nanyang Technological University — *Singapore*
Laboratory classes: 203 hours — *2016-2018*

- Labview Programming, signal processing, acquisition
- Operational amplifier, circuit logic

Articles and conferences

Relevant papers

[1] Pablo A. Prieto-Díaz, Ange A. Maurice, and Marcos Vera **Measuring density and viscosity of vanadium electrolytes: A database with multivariate polynomial fits** *Journal of Energy Storage*, 2024 10.1016/j.est.2024.112429

[2] Maurice, Ange A., Alberto E. Quintero, and Marcos Vera. **A comprehensive guide for measuring total vanadium concentration and state of charge of vanadium electrolytes using UV-Visible spectroscopy.** *Submitted with minor revisions to Electrochimica Acta*, 2024 arXiv:2307.15009

[3] Charpentier, Nicolas M., Ange A. Maurice, Dong Xia, Wen-Jie Li, Chang-Sian Chua, Andrea Brambilla, and Jean-Christophe P. Gabriel. **Urban mining of unexploited spent critical metals from E-waste made possible using advanced sorting.** *Resources, Conservation and Recycling*, 2023 10.1016/j.resconrec.2023.107033

[4] Fabien Olivier and Ange A. Maurice and Daniel Meyer and Jean-Christophe P. Gabriel **Liquid–liquid extraction: thermodynamics–kinetics driven processes explored by microfluidics** *Comptes Rendus de Chimie*, 2022 DOI:10.5802/crchim.172

[5] Ange Maurice, Khang Ngoc Dinh, Nicolas Charpentier, Andrea Brambilla, Jean-Christophe P. Gabriel **Dismantling of Printed Circuit Boards Enabling Electronic Component Sorting and treatment: A Strategy for Maximizing Elemental Recovery using Hydrometallurgy** *Sustainability*, 2021 DOI: 10.3390/su131810357

[6] Ange A. Maurice, Johannes Theisen, Varun Rai, Fabien Olivier, Asmae El Maangar, Jean Duhamet, Thomas Zemb, Jean-Christophe P. Gabriel **First online X-ray fluorescence characterization of liquid-liquid extraction in microfluidics** *Nano-Select*, 2021 DOI:10.1002/nano.202100133

[7] Ange Maurice, Johannes Theisen, Jean-Christophe P. Gabriel **Microfluidic lab-on-chip advances for liquid–liquid extraction process studies** *Current Opinion in Colloid & Interface Science*, 2020 DOI:10.1016/j.cocis.2020.03.001

[8] Ange Maurice, Laurence Bodelot, Beng Kang Tay, and Bérengère Lebental **Controlled, low-temperature nanogap propagation in graphene using femtosecond laser patterning.** *SMALL*, 2018 DOI:10.1002/smll.201801348

[9] Boris Vaisband, Ange Maurice, Chong Wei Tan, Beng Kang Tay, and Eby G Friedman. **Electrical and thermal models of CNT TSV and graphite interface.** *IEEE Transactions on Electron Devices*, 65(5):1880–1886, 2018. DOI:10.1109/TED.2018.2812761

[10] Songyan Hou, Muhammad Danang Birowosuto, Saleem Umar, Ange Maurice, Roland Yingjie Tay, Philippe Coquet, Beng Kang Tay, Hong Wang, and Edwin Hang Tong Teo. **Localized emission from laser-irradiated defects in 2D hexagonal** boron nitride. *2D Materials*, 5(1):015010, 2017. DOI:10.1088/2053-1583/aa8e61

Conferences

[11] Ange A. Maurice, Alberto E. Quintero, and Marcos Vera. **Calibrating UV/Visible spectra for accurately measuring concentration and State Of Charge in Vanadium Redox Flow Batteries: A comprehensive how-to guide** In *ISE Meeting, Lyon, France*, 2024

[12] Ange A. Maurice, Alberto Bernaldo de Quirós, Sonia Sevilla, Vanesa Muñoz Perales, Pablo Angel Prieto-Diaz, Alberto Emanuel Emanuel Quintero Gamez, and Marcos Vera. **Monitoring the State of Charge Imbalance of Vanadium Redox Flow Batteries Via Dual Online UV/Visible Spectroscopy.** In *ECS Meeting, Boston, USA*, 2024

[13] Ange A. Maurice, Johannes Theisen, Varun Rai, Fabien Olivier, Asmae El Maangar, Jean Duhamet, Thomas Zemb, Jean-Christophe P. Gabriel **On-Line Microfluidics XRF and FTIR Spectroscopy for Fast Exploration of Liquid/Liquid Extraction Thermodynamics** In *Virtual MRS Spring Meeting, Poster Presentation*, Materials Research Society, 2021.

[14] *Loïc Loisel, Ange Maurice, Bérengère Lebental, Stefano Vezzoli, Costel-Sorin Cojocaru, and Beng Kang Tay. **A graphene-based non-volatile memory.** In *Carbon Nanotubes, Graphene, and Emerging 2D Materials for Electronic and Photonic Devices VIII, Oral Presentation*, volume 9552, page 95520R. International Society for Optics and Photonics, 2015. DOI:10.1117/12.2188110

Extracurricular Activities

Community Involvement
- Badminton coach assistant certificate
- Organisation: Badminton University Tournaments

Interests
- Badminton, Squash
- Climbing, Hiking
- Cycling, Sailing
- Chess

References

Jean-Christophe Gabriel (Postdoc Supervisor)
Professor, Co-Director SCARCE at Nanyang Technological University
Université Paris-Saclay, CEA, CNRS, 91191, Gif-sur-Yvette, France.
jean-christophe.gabriel@cea.fr
Tel: +33676043559

Tay Beng Kang (PhD supervisor)
Professor, Deputy Director of CINTRA
School of Electrical & Electronic Engineering
Nanyang Technological University
S1-B1a-22, 50 Nanyang Avenue, Singapore 639798
ebktay@ntu.edu.sg
Tel: (+65)6790 4533

Marcos Vera (Postdoc Supervisor)
Catedrático (Full Professor)
Departamento de Ingeniería Térmica y Fluidos
Universidad Carlos III de Madrid
Office 1.1.F.10
E-mail: mvcoello@ing.uc3m.es
Tel: (+34) 91 624 9987