

Personal Profile

Ph.D Candidate in Chemical Engineering with hands on experience in engineering and biology techniques. Diverse academic background and conceptual skills in areas ranging from interfacial phenomena to cell biology and cancer. Currently conducting research on the evaporative dynamics and drying patterns of aqueous saline and bio-colloidal droplets for early disease diagnosis. Experienced in designing of experiments (DoE), data analysis and interpretation, and known for delivering tasks before deadline.

Areas of Interest include:

- Droplets
- Interfacial Phenomena
- Fluid Mechanics (Bio-fluids)
- Heat and Mass Transfer
- Evaporation
- (Bio) Colloids
- Biophysics
- Disease Diagnosis and Treatment

Education

Ph.D Chemical Engineering - Evaporation of Bio-droplets

Sept 2017 - Present

Institute of Multiscale Thermofluids, University of Edinburgh

Thesis

“Evaporation of Bio-drops: A basis for rapid medical diagnosis for early disease detection and monitoring”

Working with Dr. John Christy and Professor Khellil Sefiane

Investigating the drying of aqueous saline and bio-colloidal droplets on surfaces to understand the mechanisms affecting the evaporation process and the final patterns, as a tool for disease diagnosis; specifically bladder cancer.

MSc Biomedical Engineering (8.6/10)

Sept 2015 – June 2017

Cyprus University of Technology

Dissertation

“Characterization of mesenchymal stem cell-derived micro-particles for the targeted treatment of cancer tumours”

Worked on the development of a novel targeted cancer treatment through the use of Wharton’s Jelly mesenchymal stem cell-derived micro-particles which were used for the delivery of miRNAs to cancer tumours. Achieved a grade of 8.5/10.

Core Modules

Advanced Fluid Dynamics, Computational Methods, Biomechanics, Biomaterials, Biosensors, Bioinstrumentation

BSc Mechanical Engineering and Material Science (7.35/10)

Sept 2011 – June 2015

Cyprus University of Technology

Dissertation

“Study of Electroencephalography and Magnetoencephalography Problems”. Solution of the direct problem of Electroencephalography and Magnetoencephalography, via the use of mathematical analysis. Achieved a grade of 9.5/10.

Core Modules

Fluid Mechanics, Heat and Mass Transfer, Thermodynamics, Materials, Stress Analysis, Mathematics

Research Experience

Ph.D Chemical Engineering - Evaporation of Bio-droplets

Sept 2017 - Present

Institute of Multiscale Thermofluids, University of Edinburgh

Funded by Newton Fund, grant number 337066 and The School of Engineering, University of Edinburgh

Outline

- Experimentally investigating the wetting and evaporative behaviour of aqueous saline and bio-colloidal droplets on surfaces. Using solutions such as aqueous saline solutions, aqueous saline-protein mixtures, aqueous saline-urea mixtures and Foetal Bovine Serum.
- Investigating the mechanisms affecting the evaporative dynamics and the final desiccation patterns
- Examining the evaporative and contact line dynamics and the link to dynamics and pattern formation
- Establishing links between the operating conditions, such as temperature and the final pattern formation
- Establishing links between the composition of droplets, such as the concentration of electrolytes and macromolecular proteins, and the final desiccation patterns
- Examining the relationship between hydrodynamics (or physico-chemical processes) and pattern formation
- Performing image analysis to quantify topographical and morphological differences in the final desiccation patterns, depending on operating conditions and droplet composition
- Developing physical models to explain the desiccation patterns

Experienced in techniques such as:

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| ○ Drop Shape Analysis | ○ Optical Microscopy | ○ Polarised Light Microscopy |
| ○ Micro-PIV (Particle Image Velocimetry) | ○ Laser Scanning Confocal Microscopy | ○ Scanning Electron Microscopy (including EDX/EDS) |
| ○ Infrared Thermography | ○ Image Processing and Analysis | |

Lab Assistant and Researcher

Sep 2015 – Mar 2017

BioLISYS (Biomechanics and Living Systems Analysis) Lab

Outline

Involved in bioengineering and biology projects, handled mesenchymal stem cells and cancerous cells for the development of targeted cancer treatments. Prepared media and performed cell cultures and cell biology techniques. Followed cleaning procedures and practiced sterile techniques to prevent contamination. Prepared lab reports and kept record of protocols to ensure all procedures were undertaken following the guidelines. Routine recording of consumables for stock management.

Experienced in techniques such as:

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| ○ Adherent Cell Culture (Wharton's Jelly Mesenchymal Stem Cells, MDA-MB-231 GFP, HT-29 GFP, HEK-293 kidney cells) | ○ Fluorescence-Activated Cell Sorter (FACS) Flow Cytometry |
| ○ Isolation of micro-particles from Mesenchymal Stem Cells | ○ <i>In vivo</i> Flow Cytometry |
| ○ Fluorescence Microscopy and Imaging | ○ Cell Penetration and Cell Kill Assays |

Teaching Experience

Tutor and Marker

Jan 2018 - Feb 2021

Department of Chemical Engineering, School of Engineering, University of Edinburgh

- Tutor for "Thermodynamics 2"
- Tutor and Marker for "Introduction to Biochemical Engineering"

Tutor

Jan 2016 - Jan 2017

Department of Mechanical Engineering, School of Engineering, Cyprus University of Technology

- Tutor for "Mathematics 2"

Administrative Experience

School Postgraduate Experience Committee (SPEC) Representative

Oct 2018 – Oct 2019

University of Edinburgh

Outline

Represented the Ph.D students of the Institute in a committee composed of staff and postgraduate students from each research institute of the School of Engineering. Raised postgraduate student issues to improve the experience of Ph.D students. Organised events such as the School Research Conference, open days and trainings.

Publications

- Efstratiou, M., Christy, J., & Sefiane, K. (2020). Crystallization-driven flows within evaporating aqueous saline droplets. *Langmuir*, 36(18), 4995-5002.
- Efstratiou M, Christy J, Bonn D, Sefiane K. The Effect of Substrate Temperature on the Evaporative Behaviour and Desiccation Patterns of Foetal Bovine Serum Drops. *Colloids and Interfaces*. 2021; 5(4):1-19.

Conferences

- American Physical Society's Division of Fluid Dynamics (APS-DFD), Seattle 2019
- UK Fluid Network Meeting, Nottingham 2019
- School of Engineering, University of Edinburgh Research Conference, Edinburgh 2019

Software and Computing Skills

- Proficient with ImageJ (Fiji), OriginLab, and Microsoft Office
- Competent in MATLAB, Adina, SOLIDWORKS and AutoCAD
- Currently learning Python

Professional Memberships

- Member of the Cyprus Scientific and Technical Chamber

Languages

- Native Greek speaker
- Proficient in English (IELTS 8.0)
- Learning Spanish

References

Dr John Christy (Ph.D Supervisor), Senior Lecturer and Discipline Programme Manager, University of Edinburgh

- J.Christy@ed.ac.uk
- +44(0)131 6504854
- 2.2006 James Clerk Maxwell Building, Peter Guthrie Tait Road, King's Buildings, Edinburgh EH9 3FD

Professor Khellil Sefiane (Ph.D Supervisor), Chair of Thermophysical Engineering and Head of Research Institute, University of Edinburgh

- K.Sefiane@ed.ac.uk
- +44(0)131 6504873
- 2.2011 James Clerk Maxwell Building, Peter Guthrie Tait Road, King's Buildings, Edinburgh EH9 3FD

Professor Daniel Bonn, University of Amsterdam

- D.Bonn@uva.nl
- +31(0)205255887
- C4.230, Science Park 904, 1098 XH Amsterdam, Netherlands (Postal address: Postbus 94485 1090 GL Amsterdam)

