

DANIELE PESSINA

London, UK

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EDUCATION

PhD in Chemical Engineering - CASE Studentship with AstraZeneca

2022 - Present

Imperial College London

- Thesis title: A hybrid *in-silico/in-vitro* approach for integrated design and optimisation of large-molecule crystallisation
- Teaching: Strategy of Design, Separation Processes 1, Final Year Design, MSc student supervision

MEng in Chemical Engineering - 1st Class Honours

2018-2022

Imperial College London

- Modules: Advanced Bioprocess Eng., Advanced Process Optimisation, Modelling of Biological Systems, Pharmaceutical Process Development
- 4th Year Research Project: Identification of resource allocation strategies in mammalian cells

SKILLS

Technical: Numerical solution methods of dynamical systems, population balance modelling, model parameter estimation and uncertainty quantification, machine learning, techno-economic assessments

Software: Julia (SciML ecosystem, package development), Python (Pytorch, Scikit-learn), JAX, Git, Aspen Plus/HYSYS, gPROMS Suite

Laboratory: Crystallisation experiments and equipment operation (Mettler-Toledo EasyMax, FTIR, UVVis, particle-vision measurements, image-analysis, laser-diffraction size analysis), mammalian cell culture handling

Languages: Italian (native), English (fluent), Spanish (conversational)

Legal status: EU Settled Status, Italian citizen

RESEARCH AND WORK EXPERIENCE

PhD Researcher

2022 - Present

Supervision: Dr. Maria Papathanasiou & Prof. Jerry Y. Y. Heng

Imperial College London

- Implemented population-balance modelling techniques for protein crystallisation in a Julia package.
- Developed advanced uncertainty quantification methodologies for stiff, non-linear models.
- Explored data-driven surrogate and hybrid models for protein crystallisation and assessed transfer learning techniques for optimal crystallisation predictions.
- Investigated a ML-based sensitivity analysis methodology for pharmacokinetic models.
- Performed *in-vitro* medium-scale lysozyme crystallisation experiments using the MT EasyMax platform and PAT tools to investigate template-induced protein nucleation.

4th Year Research Project

Oct. 2021 - Dec. 2021

Supervision: Dr. Francesca Ceroni

Imperial College London

- Carried out cell-growth experiments for the development of a novel cell-counting protocol, establishing a relationship between light absorbance and cell count.

Lixea - Summer intern

June 2021 - Sep. 2021

Supervision: Prof. Jason Hallett

Lixea, London

- Developed an Aspen HYSYS flowsheet and techno-economic model of a novel large-scale biomass fractionation plant using lab-sourced data for use in client and investor pitches.

PUBLICATIONS

Pessina, D.; Calderon De Anda, J.; Heffernan, C.; Heng, J. Y. Y.; Papathanasiou, M. M. (2025) Integrated In Vitro/In Silico Uncertainty Quantification Method for Protein Crystallization Models. *Ind. Eng. Chem. Res.*