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| **\*Title of studentship** | Computer-aided design for advanced drug delivery system: Application in enabling formulations |
| **Value / what is covered?**  |  |
| **Awarding body** |  |
| **Number of studentships** | 2 |
| **\*Summary descriptive text / Example of research project**  | Project 1 – Rational design and manufacturing of advanced drug delivery systems: The successful candidate will complement the advanced modelling with an engineering approach to the design and manufacturing of advanced drug delivery systems. A range of advanced analytical techniques will be first utilised to understand the phase behaviours of the drug-polymer combinations, such as TEM, SEM, inline UV and Raman spectroscopy. With the guidance of the modelling, key information will be utilised for the manufacturing of drug delivery systems. The properties of these resulted systems will be fully investigated in terms of solubility, stability, metastability, drug release and membrane permeability at in vitro and ex vivo settings. Outcomes of the formulation are expect to offer better efficacy for the treatments in various infectious diseases, such as cancer, parasitic and fungal infections. Project 2 - Advanced modelling: The successful candidate will complement the experimental research with modelling of the kinetics of the drug-polymer phase behaviours. The modelling with be based on a numerical implementation (with either finite element method (FEM) or spectral methods) of the Cahn-Hilliard model and more advanced thermodynamics modelling using perturbed-chain statistical associating fluid theory (PC-SAFT) equation of state. The model will include effects of the temperature, viscosity and diffusivities of the mixture which can be assed experimentally. Outcomes of the model are expected to help design stable advanced drug delivery systems  |
| **\*Supervisor(s)** | 1) Pharmaceutical applications: PI: Dr Yiwei Tian, School of Pharmacy, Co-I: Prof. Gavin Andrews, School of Pharmacy, Dr Lorenzo Stella, School of Chemistry and Chemical Enginnering & School of Mathematics and Physics2) Advanced modelling: PI: Dr Lorenzo Stella, School of Chemistry and Chemical Enginnering & School of Mathematics and Physics, Co-I: Dr Yiwei Tian, Prof Gavin Andrews, School of Pharmacy |
| **\*Eligibility / residence Status** | International Scholarship, International self-funding  |
| **Country** |  |
| **\*Start date and duration**  | September 2022 |
| **\*Faculty** | Engineering and Physical Sciences and Faculty of Medicine, Health and Life Science |
| **\*Research centre / School** | School of Chemistry and Chemical EngineeringSchool of Pharmacy |
| **Subject area** |  |
| **Candidate requirements / Key skills required for the post**  | Applicants should have a 1st or 2.1 honours degree (or equivalent) in a relevant subject. Relevant subjects include Pharmacy, Molecular Biology, Pharmaceutical Sciences, Biochemistry, Biological/Biomedical Sciences, Chemistry, Engineering, or a closely related discipline. Students who have a 2.2 honours degree and a Master’s degree may also be considered, but the School reserves the right to shortlist for interview only those applicants who have demonstrated high academic attainment to date |
| **\*Deadline for applications** | Open all year round |
| **\*How to apply / contacts** | All postgraduate research applicants who are interested in the project must submit an application all required supporting documents via the Direct Applications Portal (link below)**.** Any interested applicants can informally contact Dr Lorenzo Stella and Dr Yiwei Tian by email at l.stella@qub.ac.uk y.tian@qub.ac.uk |
| **Relevant links / more information**  | <http://www.qub.ac.uk/schools/SchoolofPharmacy/Research/PostgraduatePositions/><http://www.qub.ac.uk/schools/SchoolofPharmacy/Research/><https://www.qub.ac.uk/schools/SchoolofPharmacy/Research/find-a-phd-supervisor/dr-yiwei-tian.html><https://www.qub.ac.uk/schools/SchoolofMathematicsandPhysics/Study/PostgraduateResearch>/find-a-phd-supervisor/dr-lorenzo-stella.html |
| **Keywords for search filters** | Thermodynamic modelling, advanced drug delivery, digital design, enabling formulation, nanoparticles, PC-SAFT |
| **Training provided through the research project** | Pharmaceuticals:Trainings will be provided for a wide range of instruments from spectroscopy, thermal analysis, electromicroscopy, microfluidics, to a number of advanced pharmaceutical manufacturing techniques, such as tableting, hot-melt extrusion, twin-screw granulation, spray drying and 3D printingModelling:Hand-on tutorials on finite element method and spectral methods to solve phase field models. |
| **Expected impact activities** | This PhD studentship will provide the important training in an interdisciplinary field of advanced modelling and nano-drug delivery. The findings of this research will lead to invited talks and presentations at both national and international conferences, and research articles in leading high impact journals. |