



Trinity College Dublin

Coláiste na Tríonóide, Baile Átha Cliath

The University of Dublin

Five-year Postdoctoral Researcher in Experimental Reaction Kinetics

Salary: €41,025 - €67,890 (+ pension) per annum, depending on experience.

Commencement before September 2022 (but negotiable).

Application will be reviewed as received.

A five-year Postdoctoral Research position is available in the research team of **Prof. Stephen Dooley** at the **School of Physics, Trinity College Dublin**.

Project: An Experimentalist is sought to work on a **European Research Council Consolidator Grant** entitled Mod-L-T: Models for Lignocellulose Thermochemical Conversion. Mod-L-T creates the first detailed, elementary, mass- and energy-conserved chemical reaction kinetic model for lignocellulose pyrolysis. Pyrolysis is a promising method to produce valuable products from lignocellulose and the basic fundamental process of more complex thermochemical technologies, such as catalysis. **Mod-L-T** deciphers the elementary reaction mechanism and kinetics of lignocellulose pyrolysis by elucidating the mysterious molecular-level details of the reaction kinetics of hemicellulose and lignin structures.

A post-doctoral researcher is sought to acquire first of a kind isothermal kinetically limited observations of the rate and mechanism of the lignocellulose, hemicellulose and lignin pyrolysis solid/solution/gas phase reaction kinetics. Lignocelluloses are solids. This complicates the acquisition of isothermal kinetically limited chemical reaction data, as complications of heat and mass transfer both occur. An advance in the state-of-art in reactor design is needed to acquire breakthrough, entirely chemical kinetic, data at known reaction temperatures. The experimentalist will lead the design, fabrication and operation of a Thin Film Reactor for kinetic studies. A prototype reactor design has been conceived to; heat a <100 μ m film of lignocellulose to 600-1000 K at > 7250 K/s; measures the film temperature in-situ in real-time by optical pyrometry; determine the rate of reaction by mass measurement; and identify & quantify the fraction of evolved gases by GCxGC-MS. This arrangement will allow for first of its kind ms time-resolved, isothermal kinetically limited characterisation of the mechanism and kinetics of lignocellulose.

Role: working in a friendly and collaborative team, the primary duties of the postdoctoral researcher are:

- Lead the design, fabrication and operation of the Thin Film Reactor.
- Work with the Principle Investigator to configure strategy for an experimental measurement campaign that will produce a library of isothermal kinetically limited data on the rate and mechanism of lignocellulose pyrolysis as a systematic function of chemical structure.
- Lead the writing of research findings in peer-reviewed publications.
- Lead the presentation of the team's findings at international conferences and stakeholder events.
- Contribute to the engagement of scientific collaborators, industry and other stakeholders.
- Contribute to the preparation of research proposals.

Research Environment: You will join the research group of Prof. Stephen Dooley who work on various science aspects of the low-carbon energy transition. Established in 2014, and hosted in the School of Physics, the group will grow to approximately twenty researchers in 2022 and is funded by a portfolio of government and industry actors including *the European Research Council, Science Foundation Ireland, the Sustainable Energy Authority of Ireland, Siemens Energy and Ryanair DAC*. You will have opportunities to interact with other research groups within Trinity, where Sustainable Energy is an identified research thrust. You will have the opportunity to travel to disseminate your research and to interact with several collaborating institutions in the United States and Europe.

Working in a very supportive research environment, you will be mentored, encouraged and trained in the skills needed to achieve your career objectives.

Essential Requirements: The successful candidate will have:

- A PhD in a chemical or mechanical engineering, physics, chemistry or a closely related area.
- Experience of conducting research by physical measurement (“by experiment”).
- A good record of high quality peer-reviewed publications commensurate with experience.
- Interest in building novel experimental facilities (equipment).
- Willingness to prototype and adapt experimental methodologies.
- Willingness to interface with information from theory to guide modelling efforts.
- Excellent organisational and communication skills.
- Demonstrated ability to manage time independently and to manage project delivery.
- Ability to learn new skills and to teach others.
- Experience in report writing, presentation writing and delivery, or proposal writing.

Application: Prospective candidates should send a two page CV containing names and contact details of two referees and a 1-page letter outlining your interest in the position and relevant experience to Prof. Stephen Dooley at dooley.recruitment@tcd.ie. Please quote the entire job title in the subject line of your email. Applications will be evaluated as received and candidates of all demographics, educational backgrounds and genders that show a good record of academic achievements will be considered.