



## The Combustion Institute

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## Postdoctoral Research Position

Two-year Postdoctoral Research Position in Thermochemical Reaction Kinetics of Lignocellulosic Fuel Conversion. Salary of €35,489 – €41,181 per annum (up to 24 months). The exact point on the scale will be determined by the experience of the candidate.

The position is available in the School of Physics, within the Faculty of Engineering, Mathematics and Science at Trinity College Dublin, Ireland, and is supported by Science Foundation Ireland, in the research team of Prof. Stephen Dooley. The project intends to provide science to alleviate global dependence on carbon intensive solid fossil fuels, such as coal, by exploiting lignocellulosic plant matter, particularly waste lignocellulose, as a viable energy source for stationary power generation.

The interaction of complicated physics and chemistry dictates the successful oxidation of solid lignocellulose when used as fuel for power generation. Plant matter is composed of different configurations of cellulose, lignin and hemicellulose, at different proportions according to the particular plant material, providing a very large degree of variability in composition. As such, historically this fuel type has been treated as an engineering material, rather than as a chemical material of identifiable functionality. The projects seeks to reverse this stance, providing fundamental scientific comprehension of direct engineering utility toward the clean burning of lignocellulose.

A series of detailed experimental measurements parameterising the mechanism of reaction by measurement of reactant, intermediate and product species as a function of temperature, oxidising gas atmosphere, and crucially – individual biopolymer reactant, will be performed. The measurements will be reconciled with fundamental physical and chemical reaction quantities derived from theory, through numerical models that encapsulate all of the essential physics and chemistry of the energy conversion mechanism.

The researcher is expected to; lead the execution of the project and its reporting in international peer reviewed journals in the Energy arena; to publicise their progress at international scientific conferences, and to engage with external collaborators, including industry. A formal background in the physical sciences, with skills and experience in the application of one of; numerical modelling (e.g. matlab, fortran, cantera, chemkin); high temperature experimentation and gas handling; sophisticated spectroscopic techniques such as one- and two- dimensional Nuclear Magnetic Resonance (NMR), solid-state NMR and mass spectrometry is required. Skills in computational physics/chemistry or of the reaction kinetics of solids (or fluids) is also helpful.

## Essential Requirements

Applicants will hold a Ph.D. degree in Physics, Chemistry, Chemical Engineering, Mechanical Engineering, or a related discipline. Interest and discipline to learn new skills in modelling and experimentation of physical and chemical phenomena is needed. An enthusiasm to challenge oneself and the possession of excellent written and oral communications skills are essential.

## How to Apply

Prospective candidates should send a detailed CV, a covering letter outlining their educational background and research track-record, and the names and contact details of two referees to Prof. Stephen Dooley ([stephen.dooley@tcd.ie](mailto:stephen.dooley@tcd.ie)). Please quote the entire job title in the subject line of your email. The 24-month position is available immediately. Applications will be evaluated as received and candidates of all levels of experience possessing appropriate skillsets will be considered.

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