

Engineered densified wood products for sustainable construction

Supervisor (primary) Imperial College London: Dr. Rupert J. Myers

Supervisors (co): Dr. Chao Wu

Applications are invited to fill a PhD position funded through internal or external scholarships, or from a student's own funding.

Project details

Recent research (<https://doi.org/10.1038/s41893-025-01605-w>) has shown the huge potential of hardwood in producing engineered wood products for construction: Relatively little wood is currently used in engineered wood products for construction, but production quantities are expected to grow in the future; most hardwood is currently used for bioenergy, 69% or 1,394 Modmt of the total hardwood harvest in 2021; and shifting hardwood from bioenergy production to construction while substituting it with more efficient energy sources would result in reduced system-wide energy demand and carbon emissions.

Current issues with using hardwood for construction include technological (e.g., limited suitable machinery), practical (e.g., demand from competing sectors such as bioenergy), and biological limitations (e.g., more heterogenous pore structure than softwood, lower suitability in terms of durability with respect to moisture). Densification is a promising method to overcome these limitations since it can remove a large amount of porosity, making the microstructure more homogenous and improving its material properties. However, the method has not yet been scaled up to industrial use.

The key aim of this project is to produce and test densified wood and engineered densified wood products, and quantify their expected energy demand and environmental impacts, to identify and demonstrate materials that have sufficiently high performance, low cost, and low climate change impact to be promising for use in general construction. This project will thus combine experimental materials science with life cycle assessment modelling.

The student will be based in the Materials Section of the Department of Civil and Environmental Engineering (Skempton Building, South Kensington Campus). On a day-to-day basis they will work alongside ~30 PhD students and ~10 postdoctoral research associates in the Materials Section, including several in their research group, led by Dr. Myers. The Section hosts the Advanced Infrastructure Materials laboratory, which is a world-class facility for concrete materials characterisation. The Department of Civil and Environmental Engineering has an excellent Structures Laboratory equipped with a wide range of high-quality equipment and staffed by a team of highly competent technicians.

This PhD project offers excellent training and development opportunities in a highly stimulating environment, as well as access to a network of internationally leading academics, industrial partners, and research facilities.

Academic requirements and experience

Required

- A first-class degree (or international equivalent) in a STEM subject, e.g., Materials Science, Civil Engineering.
- Laboratory experience.
- Programming experience.
- Strong interest in materials research.

- Excellent English communication skills.

How to apply

Applicants wishing to be considered for this opportunity should send the following application documents to Dr. Rupert J. Myers (r.myers@imperial.ac.uk):

1. Current CV including degree result and, if possible, class ranking

Application via the Imperial College Registry is not necessary at this stage.

Applications will be regularly reviewed until the position is filled.

Funding notes

Applicants interested in this project and seeking funding via scholarship schemes (see here: <https://www.imperial.ac.uk/study/pg/fees-and-funding/scholarships/>) or can self-fund are welcome to apply.