

**Postgraduate positions (MEng & PhD) in the Department of Process Engineering, Stellenbosch University, within the Bioresource engineering research group**

**Title: Steam-treatment of plant biomass for use as binder in high-quality fuels**

**Start Date: January 2021**

The Bioresource engineering research group offers a diverse and multidisciplinary approach for research and training. The research interest is focused on developing sustainable technologies for converting biomass and waste into valuable products.

**Problem statement:** Steam treatment of fibrous (lignocellulosic) plant biomass results in the “activation” of its binding properties, resulting in a material that can be applied in the production of various kinds of pellets and/or briquettes, as high-quality fuels. Some applications of this technology include the conversion of biomass fines, which would otherwise not be suitable for industrial use as fuel, or for conversion through conventional pyrolysis processes. Such fines would be converted into high-strength pellets/briquettes following steam-pretreatment, allowing a range of further applications. The steam-treated lignocelluloses may also be used as a binder to create briquettes that contain fine coal wastes. The latter are stockpiled at some of the coal processing facilities in South Africa, resulting in fire hazards and other environmental impacts. Conversion of these coal fines into briquettes through the use of steam-treated biomass as binder, offers opportunities to valorise these wastes into products suitable for industrial application. The resulting briquettes will also generate reductions in greenhouse-gas emissions, when applied for replacement of coal in existing industrial applications.

The present project can be pursued as either PhD or Master’s studies in Chemical engineering, with a focus on optimisation of steam-treatment conditions for various types of biomasses, and the implications for the further use of prepared materials in various applications. Mechanical strengths and thermal stability of the resulting pellets/briquettes, will be of particular importance.

**Details:** The project will start in January 2021, and provide funding for 2 years (Master’s) or 3 years (PhD) of studentship. The project will include a competitive bursary for the entire duration of the project.

**Eligibility criteria:**

For PhD studies: A master’s degree in Chemical Engineering.

For Master’s studies: A BEng or BScEng degree in Chemical Engineering; candidates with BTech or Advanced Diploma qualifications will not be considered for these positions.

Excellent verbal and written communication skills.

Prior laboratory experience in biomass processing is preferred but not required.

**Application Requirements:**

Interested and eligible applicants should submit a cover letter including motivation for the position, curriculum vitae (CV), a completed departmental application form, copies of their complete academic transcripts, copies of degree certificates, copy of South African identity document, and contact details of two academic references.

Applications should be sent to Professor Johann Gorgens ([jgorgens@sun.ac.za](mailto:jgorgens@sun.ac.za)), Department of Process Engineering, Stellenbosch University, South Africa.

Shortlisted applicants will be asked to participate in an interview online or via telephone.