

Graduate Research Assistantship in the School of Forest Resources of the University of Maine

A graduate research assistantship is available at the School of Forest Resources (SFR), the University of Maine in the area of biomass preprocessing and combustion to support one (1) highly qualified M.Sc. or Ph.D. student to start in January or June 2020. The overall research will focus on reducing the ash formation and particulate matter (PM) emissions of combusting Maine forest-based biomass in small-scale wood heaters. The specific research details will align with the successful candidates' experience, education, and interest. Research will be conducted at the Energy Testing Lab of SFR at UMaine.

- **Project description**

Forest residues and wood residues are an inevitable waste of virtually every single processing step of forest operations and wood products manufacturing. The shutdown of several pulp and paper mills in Maine in the past years has resulted in a significant declined demand for biomass as a feedstock. The use of biomass as an energy source has shifted to meet the residential and community heating demand. The environment and health concerns have arisen from the combustion of biomass worldwide. By 2020, wood heater manufacturers shall obey updated clear air standards with stronger PM emission limits required by the U.S. Environmental Protection Agency (EPA).

The removal of the inorganic matter in biomass would reduce the ash formation and PM emissions of combusting biomass and thereby reduce the need of installing expensive secondary emissions-control equipment in wood heaters and decrease maintenance costs through the life of ownership. The postdoctoral researcher will work on the development of effective and efficient preprocessing techniques (such as de-ashing, additives) to reduce the ash contents of biomass feedstocks and evaluation of the combustion and PM emissions of modified biomass using experimental and simulation approaches.

- **Qualifications:**

Students with a background in one of the following disciplines are encouraged to apply:

- Wood Science or Forest Products (with a focus on Chemistry);
- Chemical Engineering (with a focus on thermodynamics).

The ideal candidate is expected to have knowledge in biomass energy conversion through thermochemical pathways and chemical analysis (organic and/inorganic). The experience in using one or more instruments, such as thermogravimetric analysis (TGA), X-ray diffraction (XRD), atomic absorption spectroscopy (AAS) and ion chromatography (IC), etc., is highly desirable, but it is not a requirement. In addition, the ideal applicant is a team worker, has a high level of intellectual curiosity, and can work independently.

For the Master's student, a B.Sc. degree in one of the above disciplines is required. For the Ph.D. student, an additional M.Sc. degree in one of the above areas is required. Excellent written and verbal communication skills are required. GRE scores are used as reference. International students must have acceptable TOEFL scores or equivalent.

- **Assistantship:**

An annual stipend (about \$21,000) paid in 12 monthly installments plus half the Annual Health Insurance fee and full tuition waiver (up to 9 credits per semester) will be provided for an expected 20 hours per week appointment. Operating funds for conducting research and travel for attending the conference will also be available.

- **How to apply:**

Interested candidates should send a copy of their statement of research interest, CV, the contact information of three references to Dr. Ling Li at ling.li@maine.edu.

About the University of Maine School of Forest Resources (SFR, <http://forest.umaine.edu>):

With almost 90% of the state covered by forest, forest resources are central to Maine's quality of life and economy. The SFR provides essential forestry education and research and is a signature area of the University of Maine. Over 40 graduate students are currently enrolled in M.F., M.S., and Ph.D. programs within the SFR. The University has over 12,000 students and is the state's flagship research institution.

About the Energy Testing Laboratory of the School of Forest Resources (SFR, <https://forest.umaine.edu/news-resources/sfr-outreach/energy-testing-laboratory/>):

Based in the School of Forest Resources, the Energy Testing Laboratory provides technical analysis of forest-based biomass materials to researchers and solid biomass fuels manufacturers throughout the region. Serving as the only accredited pellet fuel testing lab in the Northeastern U.S., the Energy Testing Laboratory provides performance and quality evaluation of pelletized fuels, such as energy value and pellet durability, to manufacturers under ALSC/PFI certification. Expanded feedstock testing services include combustion efficiency for biomass energy consumers, particle size screen, wood species identification, loss on ignition analysis, and biomass composition.