

DOCTORATE RECRUITMENT

Development of Bio-based Lignin Adhesives: Adhesive Performance and Panel Properties

The wood-based composite panel industry is an evolving sector constantly seeking to adapt to consumer needs and regulations on volatile organic compound (VOC) emissions. The industry is constantly evolving to meet the needs of consumers who want products that have a low environmental impact and are safe for their health. However, the adhesives used in the conception of these panels are made of synthetic resins and petro-based materials, including formaldehyde, classified by the World Health Organization as carcinogenic for humans and animals.

Urea-formaldehyde (UF) resins are the most widely used adhesives due to their inexpensive raw materials, high reactivity, excellent wood adhesion, and more. However, they have a drawback related to the emission of free formaldehyde in composite panels. Lignin, derived from by-products of the paper industry, will be used as a substitute for UF resins. Two types of lignin will be studied: kraft lignin and hydroxymethylated lignin (lignin-H), along with their modification. The adhesive performance and panel properties will be analyzed, including internal bond strength (IB), water absorption, swelling, and density.

The consortium Corepan-Bois is a joint initiative of a research team from Université Laval, Université de Québec en Abitibi Témiscamingue, SEREX and with industrial and government partners: FPInnovations, Produits forestiers Arbec, Sacopan, Tafisa, Uniboard, Conseil de l'industrie forestière du Québec, ministère des Ressources naturelles et des Forêts du Québec. The mission of the wood-based composite panel consortium is to contribute to the research and training of highly qualified personnel in three research areas: (1) raw materials, (2) innovative processes and adhesives and (3) products and markets.

This project is part of the "Innovative processes and adhesives" theme of the consortium. The candidate will collaborate with the research consortium partners and be part of the Center for Research on Renewable Materials (CRMR). The members of the CRMR form a multidisciplinary and dynamic team, working for the development of new solid wood products, wood-based composites, wood fiber or lignocellulosic fiber and value-added co-products.

Graduate program

Ph.D. in Wood and Bio-based Materials Engineering, Département des sciences du bois et de la forêt, Université Laval.

Research director

Véronic Landry, Université Laval.

Candidate profile

Master's degree (or equivalent) in chemistry, chemical, wood or material engineering, or other related fields.

Requirements

Eligibility for the Ph.D. program in Wood and Bio-based Materials Engineering at Université Laval.

Conditions

25 000\$ per year, paid as a scholarship. Duration of 3 years.

Starting date

September 2024 or according to the candidate's availability

To apply

Send your resume, cover letter, and transcript to: veronic.landry@sbf.ulaval.ca and ingrid.calvez@sbf.ulaval.ca

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