UNIVERSITY OF CALGARY

SbM | Research Lab
S(mart) | b(uilding) | M(aterials)

Smart Building Materials (SbM) Lab
MSc & PhD Openings

The **Smart Building Materials (SbM) Lab** in the Department of Civil Engineering at the University of Calgary, led by Dr. Barney Haoyun Miao, invites applications for **1–2 MSc or PhD positions** starting in **Fall 2027** (domestic candidates may start as early as **Winter 2027**). Dr. Barney H. Miao is an Assistant Professor in Civil Engineering at the University of Calgary. He received his PhD in Civil and Environmental Engineering from Stanford University in 2026 with a PhD minor in Computer Science. He earned an MS in Structural Engineering from Stanford University in 2023 and a BSc in Civil Engineering in 2021 from the University of Calgary.

Founded in August 2026, our interdisciplinary research group bridges material science, digital manufacturing, and structural health monitoring to create sustainable, intelligent, and resilient bio-based materials for the built environment. We focus on developing Engineered Biopolymer Composites, leveraging artificial intelligence for circular synthesis, and implementing life-cycle monitoring to decarbonize infrastructure. Our mission is: *"Working towards a decarbonized and equitable built environment."*

University of Calgary

A top-tier Canadian research institution (U15) located in vibrant Alberta. The Schulich School of Engineering and the Department of Civil Engineering are recognized globally for excellence in engineering education and groundbreaking research in sustainable and advanced materials. Students benefit from state-of-the-art testing laboratories, extensive computing resources, and a collaborative spirit that drives real-world impact.

Calgary, Canada

Consistently ranked among the top 10 most liveable cities globally. A vibrant, fast-growing tech and engineering hub with vibrant culture and diverse communities. Nestled in the foothills of the Canadian Rocky Mountains (Banff is just an hour away), Calgary offers an unparalleled quality of life and year-round world-class outdoor recreation.

What We Offer

- **Competitive Financial Support & Funding:** Full stipend coverage and tuition assistance to support your academic and professional development.
- **Mentorship & Cutting-Edge Environment:** Direct, hands-on mentorship from faculty, access to state-of-the-art laboratory facilities, and interdisciplinary collaborations across engineering and computer science.

Research Focus Areas

We develop smart materials through three integrated core pillars:

- **Smart by Design:** Low-carbon, lignin-based structural alternatives and advanced biocomposite formulations.
- **Smart by Manufacturing:** Integrating AI, machine learning, and multi-sensor processing to aid in the manufacture and characterization of building materials.
- **Smart throughout Lifetime:** Developing resilient infrastructure with long service lives, real-time sensing, performance prediction, and life-cycle assessment (LCA).

For more information please explore our website! https://barneymiao.github.io/SbM-Lab/

Qualifications

Minimum Qualifications:

- B.Sc. degree for MSc applicants (GPA $\geq$ 3.5/4.0) or M.Sc. degree for PhD applicants (GPA $\geq$ 3.5/4.0) in Civil or Environmental Engineering, Materials Science, Chemical Eng, CS, Forestry, or related field.
- Proficiency in **Python** and analytical/computational techniques.

Preferred Assets:

- Experience with material characterization (SEM, micro-CT, FTIR), manufacture of specimens (e.g., working with concrete or cementitious materials), embedded sensors, large language models, machine learning, or life cycle assessment (LCA).
- Prior peer-reviewed publications (preferred for PhD candidates).

Online Application Form

Lab Website

How to Apply

Interested candidates should send an email (**smartbmlab@gmail.com**) with their application package or fill out our quick online form (**Online Application Form**).

Email Subject Line (if applying by email): `[Prospective Student - Degree] Your Name - Term`

Required PDF Documents:

1. Brief Cover Letter (1 page max) stating research interests and degree program (MSc or PhD).
2. Curriculum Vitae (CV) including publication list and contact info for 2–3 references.
3. Unofficial Transcripts (B.Sc. and/or M.Sc.).

Dr. Barney Haoyun Miao, PhD · Assistant Professor · University of Calgary · Email: barney.miao@ucalgary.ca