PhD Thesis Position in Composite Magnetic Materials and Embedded Magnetic Core Power Inductors
Universite de Moncton

Job Title	PhD Thesis Position in Composite Magnetic Materials and Embedded Magnetic Core Power Inductors
Department	Electrical engineering
Institution	Universite de Moncton Moncton, New Brunswick
Date Posted	Aug. 11, 2025
Application Deadline	Open until filled
Position Start Date	asap
Job Categories	Graduate Student
Academic Field(s)	Material/Metallurgy Engineering Physics Electrical and/or Electronics
Apply By Email	
Job Description	

Contract: Full Time/Fixed Term for three (3) years.

Supervisor:

Dr Mohamed Lamine Faycal BELLAREDJ, Assistant Professor
Department of electrical engineering, Universite de Moncton (Moncton campus)
Email: [mohamed.lamine.faycal.bellaredj@umoncton.ca]

Context & Motivation:

Because of their extreme computational needs where workloads demand rapid and significant shifts in power consumption, next-generation high-performance computing (HPC) platforms used in machine

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learning, big data and artificial intelligence (AI) based applications (CPUs, GPUs, AI accelerators etc.) require high power demands with optimized power distribution networks (PDNs) to improve power efficiency and preserve power integrity. Integrated voltage regulators (IVRs) with integrated passives can play a key role as a part of the PDN in enhancing power efficiency and performance in HPC systems. IVRs either in package or on-chip, provide voltage regulation closer to the load, enabling miniaturization and modularity while reducing resistive losses due to shorter PDN interconnects, and enabling faster power management loops with better power integrity and savings. By minimizing power loss and simplifying the circuits design, IVRs contribute to better thermal management and thus to a higher overall system efficiency.

This PhD research project targets the development of novel composite magnetic materials and package-embedded power magnetic core inductors based on these materials, which will be used to implement high frequency and high efficiency IVRs for HPC applications.

Objectives:

-Fabrication, characterization and modeling of the composite magnetic materials.

-Modeling, fabrication, characterization and of the embedded power magnetic core inductors.

-Implementation of an IVR module for HPC using the fabricated power magnetic core inductors and characterization.

Candidate Profile:

- MSc degree in electrical engineering, physics, materials science, or a closely related field.

  • Background in composite materials, magnetic materials and devices, additive manufacturing and micro/nanofabrication, power electronics, electronic packaging and integration.

  • Experience with numerical simulation and analytical computation tools: Ansys HFSS, Matlab etc.

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• Strong interest in multidisciplinary, application-driven research with desire to innovate and pursue advanced research.

- Highly analytical, with good interpersonal and organizational skills
- Strong technical writing and communications skills.

Funding

Funded position for three years with an annual salary of 18000 CAD..

Application procedure:

The application package should include all the following documents in PDF format and should be sent by email to (mohamed.lamine.faycal.bellaredj@umoncton.ca):

-A detailed CV including publication list.

-A one-page cover letter.

-Academic degrees (MSc, BSc) and transcripts.

-Your MSc thesis.

-Three (3) reference letters.

Start Date

As soon as possible (ideally October 2025). Only shortlisted candidates will be contacted.

Hosting laboratory

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The hosting laboratory will be the advanced packaging and integration lab of the electrical engineering department of the universite de Moncton (Moncton campus).

About the Université de Moncton

The Université de Moncton is a French-language university in New Brunswick, Canada, with campuses in Moncton, Edmundston, and Shippagan. It's the largest French-language university outside of Quebec. The university offers a wide range of programs across various disciplines as well as a vibrant student life, characterized by a blend of academic, social, and athletic activities. The university is known for its strong sense of community, fostered by numerous student organizations, free access to sports facilities, and a lively campus atmosphere. Moncton itself provides a welcoming affordable living environment with a mix of urban amenities and a relaxed pace, making it an attractive place for students. For more information, please visit https://www.umoncton.ca/english/.

Bibliography

[1] M. L. F. Bellaredj, et al, “Fabrication, characterization and comparison of composite magnetic materials for high efficiency integrated voltage regulators with embedded magnetic core micro-inductors,” 2017 J.Phys. D: Appl. Phys. 50 455001, DOI:10.1088/1361-6463/aa8d11

[2] M. L. F. Bellaredj, et al, “Magnetic Core Solenoid Power Inductors On Organic Substrate for System in Package Integrated High Frequency Voltage Regulators,” IEEE journal of emerging and selected topics in power electronics, vol . 8, no. 3, September 2020, DOI: 10.1109/JESTPE.2019.2914215

Contact Information

Please reference Academickeys in your cover letter when applying for or inquiring about this job announcement.

Contact

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