Advertisement for Postdoctoral Fellow (PDF) in ARDB sponsored project at the *Smart Energy & Thermal Transport Lab* at IIT Gandhinagar

Broad Subject Area: Thermal Engineering, Heat Transfer

Project Title: Scalable and Durable Frost Inhibition Coatings on Aluminum Plate & Fin and Microchannel Heat Exchangers for Aircraft Environmental Control System.

About the Project: This project aims to develop scalable and durable frost-inhibiting coatings on aluminum plate-fin and microchannel heat exchangers relevant to air cycle machines (ACMs) used in aircraft environmental control systems. The research integrates surface engineering, thermo-fluid experimentation, and modeling to (i) design and fabricate scalable micro/nanoengineered aluminum surfaces, (ii) study frost initiation, condensation dynamics, and heat transfer performance, and (iii) evaluate the durability of coatings under repeated frostingï defrosting cycles for aerospace applications.

Eligibility: Ph.D. in Mechanical Engineering, Chemical Engineering, Materials Science, Aerospace Engineering, or any relevant branch of science or engineering from a recognized institute, with a strong record of scientific publications. Candidates who have submitted their Ph.D. thesis in the mentioned fields are equally eligible. The percentage/grade points with respect to the academic qualifications will be a minimum of 60% or equivalent grade from Graduation onwards and 55% or equivalent grade in class 10^{th} and 12^{th}.

Desired Background: A strong foundation in heat transfer and phase-change phenomena, particularly in condensation, frosting, or boiling. A solid experimental background in phase-change heat transfer is highly desirable, including hands-on experience in designing and operating heat transfer experiments and thermal-fluid setups. The candidate should have demonstrated expertise in surface fabrication as well as in surface and wettability characterization using tools like contact angle goniometry, SEM imaging, and

surface energy measurements. Experience in heat exchanger testing, instrumentation, and data acquisition systems (DAQ, thermocouples, flowmeters), along with image-based diagnostics such as high-speed or DSLR imaging, is expected. Additional desirable qualifications include familiarity with numerical modeling or simulations of phase-change heat transfer using MATLAB, COMSOL, or ANSYS Fluent, and an understanding of aerospace thermal systems or HVAC&R components. A strong publication record and excellent communication skills is a prerequisite.

Key Responsibilities

- Design, develop, and test superhydrophobic and micro/nanoengineered aluminum surfaces for anti-frosting performance.
- Fabricate, characterize, and analyze plate-fin and microchannel heat exchangers with surface modifications.
- Develop and operate condensation frosting test rigs, and perform systematic thermal and mass transfer measurements.
- Conduct image-based analysis of frost initiation and propagation using optical and high-speed imaging tools.
- Perform heat transfer coefficient estimation and pressure drop analysis during frosting cycles.
- Assess durability of coatings through repeated frostingï defrosting experiments (up to 100 cycles).
- Collaborate with co-investigators and students, prepare reports, manuscripts, and patent disclosures, and present findings in review meetings and conferences.

Remuneration: Monthly remuneration of Rs. 72,000/- (consolidated)

Duration: Initial appointment is for 1 year, extendable based on performance.

Application Procedure

All applicants are required to apply by submitting the form below
https://forms.gle/kPQjxCJDmayz79Rp6

Application Deadline

The deadline for submission is **December 10th, 2025**.