



INDIAN INSTITUTE OF TECHNOLOGY PATNA
BIHTA PATNA-801106
RESEARCH & DEVELOPMENT UNIT

ADVERTISEMENT NO: R&D/537/DST/214

DATED: January 18, 2022

Project No. **PDC-537**

Applications are invited in the prescribed format only for a research project funded PhD position in the Department of Mechanical Engineering, IIT Patna.

- 1. (a) Name of the temporary assignment** : Junior Research Fellow (Provision for enrolment in Doctoral Programme)
- (b) Number of Post** : One (01)
- (c) Duration of the Post** : Two (02) years initially followed by extension subject to satisfactory performance
- 2. Name of the temporary research project:** “Permanent Dropwise Condensation via Amphiphilic Additives in Vapor Phase”
- 3. Name of the sponsoring Agency** : Department of Science and Technology (DST)
- 4. Consolidated Fellowship/Salary** : Rs. 31,000/- plus HRA as per GoI rule, for the first two years followed by Rs. 35,000/- plus HRA as per GoI rule (subject to satisfactory performance).

5. Qualifications & Experience

- a) For candidates with M.Tech./ME/MS as qualifying degree, first class (minimum 65% marks or 7.0 CPI) in M.Tech./ME/MS with GATE/NET qualifications and first class (minimum 60% marks or 6.5 CPI) in B.Tech./BE, 12th and 10th class.
- b) For candidates with B. Tech./BE as qualifying degree, 75% marks or 8.0 CPI in B.Tech/BE from institutes other than IITs/IISc and 7.0 CPI in B.Tech. from IITS and IISc with valid GATE score and first class (minimum 60% marks or 6.5 CPI) in 12th and 10th class.
- c) The age should not exceed 28 years for a candidate with BE/B.Tech/M.Sc. degree as the highest qualification and 32 years for a candidate with ME/M.Tech/MS degree as the highest qualification.
- d) Relaxations for SC/ST/OBC/women/PD will be given as per the GoI norms.

6. Description of the ONLINE MODE of the selection process:

Application procedure:

1. Candidates interested in this position and satisfying the qualification criteria should write an email to the project investigator Dr. Rishi Raj, Department of Mechanical Engineering, IIT Patna (Email IDs: rraj@iitp.ac.in and rraj.iitp@gmail.com). Please include Dr. Snehasis Daschakraborty, Department of Chemistry (snehasis@iitp.ac.in), and the Co-Investigator in this project in the cc list.
2. The **subject of the email** should read as “*PhD Position PDC-537*”. The last date for receiving this email is **29th January 2022**.
3. The email **MUST** include the **scanned/pdf copy of duly filled application form** (see attached word document) with applicant’s signature.



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4. The email MUST include self-attested scanned **pdf copy of all supporting documents** (degree certificates, mark-sheets, GATE scorecard, and category certificate, if applicable).
5. The application should additionally include a **500-word statement of purpose (SOP)**. This document should elaborate on your interest in this project and any relevant prior experience/skills which would help you in solving the assigned research problem.
6. The application should also include a brief **Academic CV** not exceeding two pages.

IIT Patna reserves the right to not shortlist any candidate in case the application email does not contain complete information backed up by supporting documents as listed above.

All candidates who apply via email by **29th January 2022** (deadline) and are shortlisted will be informed regarding the further details by 5th February 2022.

Date of ONLINE Interview: 10th February 2022 (*11th February has been kept as the reserve day in case of large number of applications*). It is the responsibility of the applicant to ensure that they have a reliable internet connectivity on the date of online interview.

7. About the Project: Surface treatment strategies which promote dropwise condensation are of significant interest in applications such as heat pipes, heat exchangers, power plants, and water desalination/harvesting. Despite decades of research, stable dropwise condensation has been hardly realized in practical industrial applications due to the following reasons: (i) coatings increase the manufacturing cost, (ii) coatings add a parasitic thermal resistance, (iii) long-term robustness of coatings is still an issue.

IIT Patna in collaboration with the Korea Advanced Institute of Science and Technology (KAIST) proposes a paradigm shift in how dropwise condensation is attained in practical applications. The team will incorporate volatile amphiphilic additives (low vapor-pressure surfactants and ionic liquids) in the vapor-phase along with the steam. These vapor-phase amphiphiles will be adsorbed on to the liquid-vapor interface of the condensing droplets. The amphiphile laden droplets will then repel each other to promote dropwise condensation on any surface in contrast to conventional condensers wherein a gradual transition to the film wise regime occurs. We expect to facilitate permanent dropwise condensation on any surface without requiring complex surface modification. Through this study, we will target over 5 times enhancement of



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heat transfer coefficient and will demonstrate continuous dropwise condensation over 1000 hrs at high supersaturation.

The student selected in this project will be expected to collaborate with the team of researchers at IIT Patna and KAIST to successfully execute this project. The selected student will also be expected to undertake a few short-term visits (provided that the pandemic situation is over and it is safe to travel) to South Korea as a part of this project.

Applicants may contact Dr. Rishi Raj and visit www.iitp.ac.in/~rraj for further details on the research undertaken in the Thermal and Fluid Transport Laboratory (TFTL), IITP. Dr. Snehasis Daschakraborty, Department of Chemistry (snehasis@iitp.ac.in. Web: <https://www.sdmdlab-iitp.com/>), the Co-Investigator in this project may also be contacted.

Assistant Registrar

Copy to:

1. Associate Dean, R&D, IIT Patna
2. Advertisement file
3. Project file