



About Collaborative and Coordinated Research Project (CRP) Programme

BRNS has identified some of the priority research areas in which scientists from different units of Department of Atomic Energy (DAE) are interested in establishing collaborations with research groups from academia and research institutes outside DAE. Interested Principal Investigators (PI) and Co-PIs from the non-DAE institutes, may communicate with Principal Collaborators (PC) / Co-PC from DAE units / institutes, for working out detailed project proposals for collaborative research. Such project proposals, in required BRNS format, shall be submitted on BRNS website, for evaluation and consideration of BRNS for suitable funding. The proposed project proposal shall have clear deliverables and timeline.

Salient features of CRP programme are as follows:

1. CRPs will be in priority research areas identified by DAE units.
2. Project Proposal Applications (PPAs) will be prepared jointly by PIs from participating institutions outside DAE and PCs from DAE Units.
3. Proposals should be submitted ONLY BY ONLINE MODE (<https://brns.res.in>) by Scientists / Engineers / Researchers / Technologists working in Academic Institutions and National Universities. For further details, please refer terms and conditions available on BRNS website.
4. PI should have relevant work experience (publications, patents, prototype, technology demonstration should be cited in submission).
5. A CRP may consist of multiple sub-projects and based on research areas and expertise of PIs and Co-PIs, may have participation of multiple institutions.
6. A PI who has any ongoing BRNS project is not entitled for any CRP project / sub-projects. Similarly a PC who has two ongoing projects, is not eligible for participation in a CRP or any other project / sub-projects of BRNS.
7. The duration of CRP implementation will be 3-5 years accordingly, deliverables from each Sub-project (maximum duration 3 years) will be integrated into the main project within its span.
8. Selection and evaluation of a CRP will be based on collective merit of all its components / sub-projects to deliver the end result embedded in CRP mandate.
9. Processing of sub-projects under each CRP title will be same as stand-alone research project. However from inception to closure, to fulfill the objective of CRP, these sub-projects will be processed in collective manner. Progress review and subsequent funding also will be done in integrated manner for all the sub-projects of the CRP.

10. Deliverables and time schedules will be clearly defined and the progress will be monitored at frequent intervals for all the sub-projects of a CRP.
11. Project / Sub-projects of CRP proposals will be evaluated and recommended by BRNS committees.
12. Technology Readiness of participating research groups in executing the projects will be given due importance & consideration.
13. Project proposals with translational components and market potentials will be given preference.
14. The list of priority research areas will be updated frequently, as and when fresh proposals, duly forwarded by Heads of DAE units are received in BRNS Secretariat.

Titles of the Coordinated Research Projects (CRP) and sub-projects for which project proposal application (PPA), have already been submitted by Project Investigators (PI) on BRNS website in year 2021, are as follows.

- 1. Decoding Flow Physics of Elevated Temperature Fluidized Bed Reactors by Using Radiotracer Techniques for Design and Scale-up. Dr. K. K. Singh (PC), Email: kksingh@barc.gov.in**
 - a. Investigation of Solid Flow Field in a Gas-Solid Fluidized Bed at Elevated Temperature through Radiotracer Techniques and CFD Simulations. Shri Sandip Bhowmick (Co-PC-1) sandipb@barc.gov.in; Shri. V.K.Sharma (Co-PC-2) vksharma@barc.gov.in
 - b. Study of Solid Hydrodynamics in an Elevated Temperature Gas-Solid Fluidized Bed with Secondary Gas Injection through Side Wall Pneumatic Nozzles. Shri Sandip Bhowmick (Co-PC-1), sandipb@barc.gov.in; Shri. V.K.Sharma (Co-PC-2) vksharma@barc.gov.in
 - c. Investigation of Solid Flow in an Elevated Temperature Fluidized Bed with Decomposing and Non-Decomposing Liquid Injection through Side Wall Pneumatic Nozzles. Dr. Jayashree Biswal (Co-PC-1), jbiswal@barc.gov.in ; Shri Sandip Bhowmick (Co-PC-2), sandipb@barc.gov.in
 - d. Study on Two and Three Phase Fluidized Beds: Hydrodynamic and Machine Learning (ML) based Computational Fluid Dynamics (CFD) Investigations. Dr. Sunil Goswami (Co-PC-1), gsunil@barc.gov.in; Shri Sandip Bhowmick (Co-PC-2), sandipb@barc.gov.in
- 2. First Principles Simulation of organic molecules used for Separation Processes. Dr. S. K. Musharaf Ali (PC), musharaf@barc.gov.in; Dr. Anil Boda (Co-PC-1) anilboda@barc.gov.in; Smt. Pooja Sahu (Co-PC-2) psahu@barc.gov.in; Shri Nirbhay Chandorkar (Co-PC-3) nirbhayc@barc.gov.in**
 - a. Software platform for ATOM: Atomistic technology for Materials
 - b. Organic halide to dioxane and furan: First principle and reactive force field simulations study of kinetic mechanism, extraction and remediation
 - c. Solvent design for ion extraction
 - d. Rational selection of task specific materials for H₂ storage using machine learning and Monte Carlo Simulations
- 3. Study and validation of an atmospheric pressure plasma jet (APPJ) for bio-medical applications. Dr. Alphonsa Joseph (PC) alphonsa@ipr.res.in; Dr. Ramkrishna Rane (Co-PC-1)**

- ramu@ipr.res.in; Dr. Akshay Vaid (Co-PC-2) akshay@ipr.res.in; Dr. Anand Visani (Co-PC-3) avisani@ipr.res.in
- a. Assessment of Blood Coagulation by Cold Atmospheric Pressure Plasma Jet and its Correlation with Coagulation profile of Human Subjects
 - b. Enabling Cutaneous Wound Healing Using Cold Atmospheric Pressure Plasma Jet
 - c. Evaluation and Comparison of Cold Atmospheric Pressure Plasma Jets efficacy against E. Faecalis and its biofilm in Root Canal sterilization: In Vitro Study
 - d. Comparison on the Effect of Enamel and Dentin Wettability and Enamel Shear Bond Strength on Orthodontic Brackets using Atmospheric Pressure Plasma Jet with the Conventional Bonding Techniques
4. **Reduction of Drag Force in Automobiles using Active Plasma Actuator.** Dr. Rajesh Kumar (PC) rkumar@ipr.res.in; Shri N. Ranjan Babu (Co-PC-1) ranjan@ipr.res.in; Mr. Agrajit Gahlaut (Co-PC-2) agrajit@ipr.res.in
- a. Plasma actuator development and characterization
 - b. CFD/Thermal/electrical simulation
 - c. Development of power supplies
 - d. Development of testing facility and for testing of plasma actuator in scaled down automobile model
5. **Multimodal Approach to evaluate pathogenicity of genetic variants identified in triple-negative breast cancer susceptibility genes, a way for clinical management.** Dr. Ashok Kumar Varma (PC) avarma@actrec.gov.in
- a. To evaluate the pathogenicity of genetic variants identified from Mizo population with inherited Triple-negative breast cancer (TNBC). Dr. Nandini Verma (Co-PC-1) nverma@actrec.gov.in
 - b. To evaluate the pathogenicity of genetic variants identified from Sikkimese population with inherited Triple-negative breast cancer (TNBC), Dr. Poonam Gera (Co-PC-2), pgera@actrec.gov.in
 - c. To evaluate the pathogenicity of genetic variants identified from Rural Central India population with inherited Triple-negative breast cancer (TNBC), Dr. Avinash Kale (CO-PC-3), avinash.kale@cbs.ac.in
 - d. Functional characterization of genetic variants identified from Mizo, Rural Central India and Sikkim population with inherited Triple-Negative Breast Cancer (TNBC), Dr. Shilpee Dutt (Co-PC-4), sdutt@actrec.gov.in
6. **Tools and Techniques for establishing novel targets and identifying novel drugs in EX vivo Pre metastatic Settings;** Dr. Prasanna Venkatraman (PC) vprasanna@actrec.gov.in, Dr Sorab Dalal (Co-PC), sdalal@actrec.gov.in
- a. Role of Gankyrin in Cell Migration via interaction with CLIC1
 - b. Identify the CLIC1 helix directly involved in interaction with the lipid
 - c. Design and synthesis of protease resistant cell permeable peptide derivatives
 - d. To identify the important genes and their interactions from RNA seq data using the pareto optimality curves generated using the computational algorithm
7. **Development of peptide based infection imaging agents and deciphering interaction mechanisms of novel peptides with model cell membranes.** Dr. Archana Mukherjee (PC) archanas@barc.gov.in; Dr. Mukesh Kumar (Co-PC-1) mukeshk@barc.gov.in; Dr. Veerendra

K.Sharma (Co-PC-2) sharmavk@barc.gov.in; Ms Jyotsna Bhatt Mitra (Co-PC-3) jyotsnab@barc.gov.in

- a. Synthesis of novel peptides and chelators for development of infection imaging agents
 - b. Deciphering interaction mechanism of novel peptides and their conjugates with model bacterial and mammalian membranes using various biophysical methods
 - c. Effects of novel peptides on the structure and phase behaviour of the model cell membranes
8. **Preparation and evaluation of ^{68}Ga and $^{99\text{m}}\text{Tc}$ -radiopharmaceuticals for imaging and ^{177}Lu radiopharmaceuticals for therapy of cancers.** Dr. Drishty Satpati (PC) drishtys@barc.gov.in; Dr. Pradip Chaudhary (Co-PC-1) pchaudhari@actrec.gov.in; Dr. Kusum Vats (Co-PC-2) vkusum@barc.gov.in
- a. Pre-clinical evaluation of receptor-targeted radiolabeled ($^{68}\text{Ga}/^{99\text{m}}\text{Tc}/^{177}\text{Lu}$) peptides in tumor bearing animal models and clinical evaluation in human subjects. Dr. Kusum Vats (Co-PC-2) vkusum@barc.gov.in
 - b. Clinical evaluation of diagnostic ($^{68}\text{Ga}/^{99\text{m}}\text{Tc}$) and therapeutic (^{177}Lu) radiolabeled peptides targeting receptor over-expression in different cancers. Dr. Drishty Satpati (PC) drishtys@barc.gov.in
9. **Apatite and Apatite based composites for multidisciplinary applications.** Dr. A.K. Arya, aarya@barc.gov.in ; Dr Pranesh Sengupta, (PC), sengupta@barc.gov.in
- a. Heavy metal Sequestration by Apatite. Rumu Haldhar Banerjee (Co-PC-1), rumu@barc.gov.in
 - b. Development and characterization of additively manufactured nano-hydroxyapatite / polyamide nanocomposite for bone scaffolds designed by machine learning. Dr Kuldeep Sharma (Co-PC) kuldeeps@barc.gov.in
 - c. Surface modification of titanium / titanium alloys for improving bone integration. Dr. A.K.Sahu (Co-PC) ashok@barc.gov.in
 - d. Stability and defect studies within Apatite based materials through simulations. Dr. P.S Ghosh (Co-PC) psghosh@barc.gov.in
10. **Improvement of blast disease and yellow (stripe) rust resistance in Indian wheat by radiation induced mutation breeding.** Dr. Tapan Ghanty ; tapang@barc.gov.in
- a. Improvement of recent high yielding wheat varieties for enhanced resistance to blast disease of wheat
 - b. Improvement of recent high yielding wheat varieties for enhanced resistance to virulent races of yellow rust
 - c. Molecular characterization of yellow rust and blast resistant mutant lines/varieties using advanced molecular biology tools
 - d. Understanding the molecular basis of yellow rust and blast disease resistance (using the mutants & parents) for attaining durable resistance

11. **Nuclear Power Corporation India Limited (NPCIL), DAE, is looking forward to Research Project proposals, in the following areas. Interested PIs may contact the proposer as indicated below as PC and formulate a joint project proposal application (PPA) to submit on BRNS website before the due date. The format of PPA is available on BRNS website.**
- i. Characterization of Passive Catalytic Recombiner Device (PCRD) Performance for Various Environmental Factors. **Mr. Suresh K. Datir (PC)**, skdatir@npcil.co.in
 - ii. Development of CPU Module using open source based RISC-V (Reduced instruction set for computing) Architecture and its Qualification. **Smt. Ajita Srivastava (PC)**, ajitas@npcil.co.in
 - iii. Development of Multi-Channel Analyser (MCA) based Spectroscopic Measurement of FPNGs (Fission Product Noble Gases) at High Gamma Dose Rate. **Mr. R. Balasubramanian (PC)**, rbalu@npcil.co.in
 - iv. Indigenous Development of Cost Effective Polymer Membranes (both Cation and Anion Exchange Membranes) for Hydrogen Production through Water Electrolysis. **Shri. Jimmy Mathew (PC)**, jmathew@npcil.co.in
 - v. Development of Non-noble Electro-Catalysts for Hydrogen Generation by Water Electrolysis. **Shri. Jimmy Mathew (PC)**, jmathew@npcil.co.in
 - vi. Development of a computer Code for the estimation of leak rate from a cracked pipe (circumferentially and axially) carrying fluid (i.e. D₂O/H₂O) with partial boiling condition as in case of 700MWe Indian PHWR. **Shri T.A.Khan (PC)**, takhan@npcil.co.in
12. **Evaluation of mechanical properties and micromechanisms in advanced structural materials for high temperature applications. Dr. A. Nagesha (PC)**, nagesh@igcar.gov.in
- a. Evaluation of creep properties of indigenous Alloy 617M. Dr. J. Ganesh Kumar (Co-PC), ganeshkumarj@igcar.gov.in
 - b. Evaluation of creep properties of indigenous Alloy 625M castings. Smt. J. Vanaja (Co-PC), vanaja@igcar.gov.in
 - c. Evaluation of elevated temperature low cycle fatigue and creep-fatigue interaction behavior of indigenous Alloy 617M. Dr. E. Issac Samuel (Co-PC), issac@igcar.gov.in
 - d. Micro-mechanical investigation of indigenous Alloy 617M, Alloy 625M and Alloy conforming to ASTM B983. Dr. Diptimayee Samantaray (Co-PC), deepsaroi@igcar.gov.in
13. **Micro-mechanics of crack initiation and propagation in an indigenous Alloy 617 forged alloy at high temperature regime. Dr. Aniruddha Moitra (PC)**, moitra@igcar.gov.in
- a. Effect of temperature and load ratio on fatigue crack growth parameters (ΔK_{th} and Paris Constants) for a forged alloy 617 material. Dr. Aniruddha Moitra (Co-PC), moitra@igcar.gov.in
 - b. Creep Crack Growth (CCG) studies on alloy 617 forge material. Dr. S. Athimoolakrishnan (Co-PC), sakrish@igcar.gov.in
 - c. Creep-Fatigue Crack Growth (CFCG) studies on alloy 617 forge material. Dr. Matcha Nani Babu (Co-PC), nanibm@igcar.gov.in

- 14. Design and development of material (ligands, polymers, foams, macromolecules, MOFs) for the recovery of Platinum group metal (PGMs) from high level liquid waste. Dr. C. V. S. Brahmananda Rao (PC), brahma@igcar.gov.in**
- a.** Extraction of Platinum Group Metals (Ru/Rh/Pd) from aqueous nuclear waste using triptycene based ionic porous organic polymers. Dr. N. Ramanathan (Co-PC), nram@igcar.gov.in
 - b.** Functionalized Molecules, Polymers and Resins bearing N, S and P groups for the separation and recovery of Platinum Group Metals (PGMs) from high acid medium. Dr. S. Suneesh (Co-PC), suneesh@igcar.gov.in
 - c.** Porous Hybrid Materials for the selective extraction of Platinum Group Elements from high acid medium. Dr. B. Sreenivasulu (Co-PC), bsrinu@igcar.gov.in
 - d.** Design and development of functionalized molecules and foams for the separation and recovery of Platinum group metal from high acid medium. Dr. G. Gopa Kumar (Co-PC), gopakumar@igcar.gov.in

For any further detail on CRP programme, you may write to Dr. Ajay Kumar, Programme Officer, BRNS (Email: ajaykls@barc.gov.in).