From the Editor's Desk...

The Editorial Board is happy to bring out second issue of the RRCAT Newsletter for year 2022 comprising reports of various R&D activities and events organized at RRCAT during the period **January - June 2022.**

In line with tradition, we assorted all the reports on various R&D activities of the Accelerator programme in the first section of the Newsletter. This section contains eleven reports, starting with a status report on the operation of Indus-1 and Indus-2 synchrotron radiation sources, followed by a report on the utilization of Indus beamlines by users from all over the country. Two reports cover activities related to horizontal test stand (HTS) facility at RRCAT, which include testing of dressed superconducting RF cavity at 2 K and development of a 6-channel fluxgate multiplexer module for measuring the magnetic field in the HTS facility. This issue contains three reports associated with the electron-beam radiation processing facility developed at RRCAT. These reports cover the activities on the process development and validation for e-beam sterilization of several medical devices, the successful conduct of the endurance test for Linac-3, and the development of a 16-channel programmable trigger generator (PTG) module with FPGA based controller board and optical fiber transmitters to facilitate the precise time-synchronized operation of Linac for electron-beam radiation processing facility. A report on the design, fabrication, and testing of a 2 kW DC strip type electron gun system producing beam energy of 2 keV and a current of 100 mA to be used to test the photon absorbers is also included. Besides various accelerator machine-related accomplishments, the first part also contains two reports falling in the realm of materials science involving non-destructive depth profiling of energetic Au ions inside p-type Si substrate and the identification of superstructure in the Heusler alloy $Co_{1+x}MnSb$.

Important accomplishments in field of lasers and their applications are showcased in the second section of Newsletter, which contains seven reports. The first report describes the development of an Nd:YAG laser with an average output power of 1.5 kW for cutting and welding of metals and alloys. The next two reports focus on the growth of large-size KDP crystals possessing good optical quality and the use of in-house grown, single-crystal of Cr:Nd:$GdVO_4$ for self Q-switched lasing action. The next three reports are devoted to the development of an automated SERS measurement and analysis system, an in-house MOVPE-grown GaAs-based detector for measuring X-ray absorption edges of transition metals, and a supercapacitor module with 4.5 kJ capacity using in-house synthesized Nitrogen-doped carbon aerogel. The last report in this section describes the research carried out to study the effect of interface states on the electric field and diamagnetic-Landau energy shifts in InGaAs/GaAs quantum wells.

The third section of this edition contains three reports on the accomplishments related to the development of infrastructure at RRCAT. The first report is about the commissioning of a comprehensive electronics key management system (EKMS) at seven security posts and one at administration building. The second report informs that the Centre has adopted and designed an alternative deep root (sub surface) irrigation system to circumvent the problem associated with drip irrigation system. The third report details about installation, commissioning and testing of synoptic panels of fire detection and alarm system at Indus accelerator complex.

This edition of the RRCAT Newsletter contains three *Theme Articles* that review some of the significant R&D activities pursued at RRCAT. The first two *Theme Articles* review the design and development of active shunts used for beam-based alignment of beam positioning monitors in Indus-2 and the application of machine vision system for automation and quality assurance in fuel fabrication process. The third Article is a part of a Ph. D. thesis, which reviews the experimental studies carried out to investigate the effect of various process parameters on the laser-directed energy deposition based additive manufacturing of Hastelloy-X thin walls and bulk structures.

The last section reports on "Events and Happenings" at RRCAT. In this section, activities of Incubation Centre-RRCAT for technology transfer and incubation of the technologies developed in the Centre have been highlighted. Further, report on celebration of National Science Day-2022 through online mode under "Azadi Ka Amrit Mahotsav" is also covered. Foundation Day celebration and other regular activities of Clean and Green Campus, Industrial safety, Fire safety, RRCAT Staff Club, AECS, Indore are also reported in this section.

We have included a list of colleagues and Ph. D. scholars who have won awards and accolades for their accomplishments. We remember all those colleagues, who have superannuated from their services during this period and we wish them a happy and healthy post retirement life. The final report is devoted to activities for promotion of Hindi language among the staff members of RRCAT.

The Editorial Board would like to thank all the contributors for their cooperation. We take this opportunity to express our deepest gratitude to Director, RRCAT, for his keen interest, guidance, and active support. We look forward to receiving constructive comments and suggestions from readers for improving the content of RRCAT Newsletter.

With warm regards,

Arup Banerjee
Chairman, Editorial Board
(on behalf of RRCAT Newsletter Editorial Board)

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