

From the Editor's Desk...

We are happy to bring out the first issue of RRCAT Newsletter of the year 2021, giving a highlight of various activities and events that have taken place in the second half of the last year. With this issue, we have stopped the print version of the RRCAT Newsletter, and switched to *only digital* version, which required a change in the administrative procedure for publication. Due to this reason, and also due to the outbreak of second wave of COVID-19 in April 2021, and consequent lockdown imposed till May 2021, publication of this issue is unfortunately delayed. We however hope to make up for this in the next issue.

The first section reports important achievements made on the accelerator related activities. It begins with the status reports on Indus operations and utilization. This is followed by reports on new developments and an important system upgrade in Indus-2 accelerator. Reports on new developments describe the development and installation of a supervisory control system for beam based alignment, a high speed data acquisition and processing platform for beam position indicators, and a prototype serial communication analyser for Indus control system. Report on new upgrade describes the replacement of ageing power converters of TL-2 steering magnets with new ones. Other important achievements, such as development of a set-up for measurement of temporal magnetic field profile of pulsed magnets, design and development of a 325 MHz, 150 kW pulsed solid state amplifier, and testing of a combination of sputter ion pump and non-evaporable getter pump to achieve ultra-high vacuum in limited space are also reported in this section. This section ends with a report describing the studies of the crystallographic, optical and electronic properties of $\text{Ni}_{1-x}\text{Co}_x\text{O}$ ternary over complete compositional range, using Indus-2 beamlines BL-09 and BL-11, for their possible applications in band gap engineering and transparent anti-ferromagnetic spintronics with tunable Neel temperature.

Important achievements on laser related activities are described in the next section, which describe activities related to new development, as well as important applications of lasers. This section starts with reports on development of a 4.5 W diode-pumped solid state green laser for pumping of Ti: Sapphire laser, a 100 W Tm-doped cw fiber laser for possible medical applications, and a 1 W narrow line width fiber amplifier at 1550 nm for various applications. This is followed by reports on applications of laser for glass particle deposition on steel mesh for oil water separation; and also on improvement of wear resistance of Inconel 718 by laser boriding process. Important achievement on successful demonstration of XRD of Si powder sample using the pulsed x-ray generated by laser plasma source is also reported. This section ends with a report on development of Neelbhasmi - an UV based area sanitization device, which is an important societal application of ongoing R&D at RRCAT.

The following section describes important achievements related to infrastructure development and services. It starts with a report on fabrication of a new vacuum chamber of energy filtering magnet of 9.5 MeV, 10 kW electron linac (Linac-3). This is followed by two reports on important civil construction works, emphasizing the objective of sustainable development.

This issue of RRCAT Newsletter has two *Theme Articles*. The first *Theme Article* gives a comprehensive overview of Fiber Bragg Grating sensors that have been developed at RRCAT over last several years for a wide variety of useful applications, involving detection of temperature and strain in harsh environment. Details of useful applications, such as the wheel impact load detection system for railway safety, temperature monitoring system for the Glove Box of Fuel Recycling Chamber at BARC, Tarapur etc. are described in this article. The second *Theme Article* brings forward details of the recent studies on physics and applications of semiconductor quantum wells under high magnetic field, carried out as a part of author's Ph. D. thesis. These studies are expected to play important role in extending the operating range of diode lasers and photo-detectors with the help of high magnetic field.

The news section reports lots of new events and happenings during the period July 2020 – December 2020. It starts with a report on Incubation Centre at RRCAT, inaugurated by Chairman, AEC. This is followed by a report on technology transfer of high power (2 kW average and 3 kW pulsed) RF amplifier modules and also for three types of co-axial to N-type transitions, and on grant of an Indian patent on laser welding of niobium superconducting radio frequency cavities. Subsequently, a report on TASAR activities carried out during this period is presented. Regular activities of clean and green campus and staff club are also reported in this section. Further, the reports on accomplishments of our distinguished colleagues, along with various activities carried out for the promotion of Hindi usage are included. In this section, we also welcome new members to the RRCAT family and bid farewell to those who superannuated during this period.

The Editorial Board would like to thank all contributors. We would like to express our deepest gratitude to Director, RRCAT, for his keen interest, guidance and active support. We look forward to receive constructive suggestions from readers towards improving the Newsletter content.

With warm regards,

August 18, 2021

Vinit Kumar
Chairman, Editorial Board
(on behalf of RRCAT Newsletter Editorial Board)