



## *From the Editor's Desk...*

We are happy to bring out the combined issue of RRCAT Newsletter, giving a highlight of various activities and events that have taken place in the second half of the last year, and also first half of this year. Due to the unprecedented situation arising after the outbreak of COVID-19 in March 2020, and the nationwide lockdown imposed after that for around two months, publication of Issue 1 of the year 2020 could not be brought out in time. It was therefore decided to combine the Issue 1 and Issue 2 of the year 2020, and to bring out a single combined issue to bring back the publication schedule of RRCAT Newsletter on track.

The first section reports important achievements made on the accelerator related activities. It begins with the status report on Indus operations and utilization. This is followed by reports on various upgrades on Indus-2 accelerator, such as installation of a vertical pinger magnet, upgraded pulsed RF system for injector microtron, and control system with reliability enhanced on machine interlocks; and on successful demonstration of NEG coating of small aperture vacuum chambers for insertion devices. Next three reports describe details of the 9.5 MeV, 10 kW electron linac, named Linac-3, which is being developed for societal applications. Later part of the section has reports on development on end lever tuner for SCRF cavity, on dressing of SCRF cavity (with helium vessels, couplers and tuners) using an indigenously developed welding glove box, and on the control system of Horizontal Test Stand for characterization of the dressed SCRF cavities.

Important achievements of laser related activities are described in the next section, which describe activities related to laser development, laser applications and materials research. This section starts with reports on an engineered version of 500 W all-fiber single transverse mode Yb-doped cw laser, a fiber-optic front end laser system for high energy laser, a 100 W cw Nd:YAG laser operating at 1320 nm wavelength, and a capillary discharge based soft x-ray laser with per pulse energy of 70  $\mu$ J. On the front of applications of laser technology, there are reports on laser cutting of pipelines of emergency core cooling system of the Kudankulam Nuclear Power Station Unit-2 reactor, and on thick coating of SiC on zircaloy-4 tubes and manufacturing of mesh type spacers for reactor applications, both using laser additive manufacturing. Scientific research on materials are described in this section at the end, which has reports on growth of monocrystalline distributed Bragg reflector mirrors with reflectivity exceeding 99% at technologically important wavelengths, on development of GaAs based spin-Hall devices, on development of organic scintillator trans-stilbene (TSB) polymer composite for x-ray imaging, on development of Ce:YAG screen for x-ray detection, development of visible blind UV photodetectors based on  $Mg_xZn_{1-x}O$  thin films, and development of thermally stimulated current measurement setup for characterizing photovoltaic materials.

The first Theme Article gives a comprehensive overview of upgradation of Indus-2 in recent past that has been achieved through indigenous development of required technology. Details of very useful experiments on nuclear materials performed using Indus-2 beamlines are described in the second Theme Article. This is followed by the third Theme Article, which focuses on important application of high power solid state laser developed at RRCAT for the nuclear reactor program in the country. The fourth Theme Article brings out an important outcome of materials research in terms of development and deployment of radiation resistant GaAs based PIN photodetectors. Finally, the fifth Theme Article brings forward details of the recent studies on laser plasma acceleration using 150 TW laser, carried out as a part of the first author's Ph. D. thesis.

The Events and Happenings section reports lots of new events and happenings during the period July 2019 – June 2020. Several important events, such as RRCAT Foundation Day celebration, National Science Day celebration, inauguration of 3<sup>rd</sup> batch of Trade Apprenticeship Scheme, 5<sup>th</sup> HBNI Research Scholars' Day, Women's Day celebration etc. are covered in the Newsletter. The "ISO-ISMPO 2019 Conference" hosted by RRCAT was also an important event, which is reported. The technology transfer function for 60 kW RF broadband dual directional coupler is also reported. 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,

November 26, 2020

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