From the Director's Desk...

I am happy to see that the first issue of this year's RRCAT Newsletter is ready for publication. There have been several new developments since the publication of the previous issue. This issue reports on a number of significant advances the Centre has made in the second half of 2017.

The Synchrotron Radiation Sources Indus-1 and Indus-2 are operating in round-the-clock mode for last 8 years. Researchers from more than 140 institutes from all over India are using the facility for a variety of investigations. During the year 2017, the beam was available for about 5200 hours to the users of Indus-2 and much longer for the users of Indus-1. In all, 765 user experiments have been carried out in 2017, which is about 20% more than the number during 2016. Similarly, in 2017, 136 papers have been published in peer reviewed international journals on the work carried out on Indus beamlines, which is about 24% more than the number during 2016. This issue of the Newsletter also carries a few reports covering the recent work carried out using Indus beamlines.

R&D efforts are also going on to develop various technologies and processes such as long-pulse modulators for high power microwave sources and non-evaporable getter coatings to attain ultra-high vacuum. Electron beam radiation processing is also useful for a variety of societal applications including the processing of medical, agricultural and food products. Of the two 10 MeV, 5 kW electron linacs developed, the first linac shifted to Agricultural Radiation Processing Facility is undergoing beam testing, and the endurance testing of the second one has been carried out at RRCAT. A new type of X-link tuner has been developed for tuning of single-cell and multi-cell SCRF cavities for the proposed ISNS project, for which a Japanese patent has been recently granted. Installation and performance evaluation of the 20 kW solid-state pulsed power amplifier, delivered to CERN for CLIC project under DAE-CERN collaboration, has been successfully carried out.

The accomplishments in the laser R&D are equally noteworthy. An Nd:YAG green laser with 260 W output power at 532 nm has been successfully developed and characterized. As a part of Centre's initiative towards developing laser equipment and procedures for nuclear reactor related applications, laser cutting of pipeline for replacement of double check valve at Kudankulam Nuclear Power Plant–1 reactor was carried out using indigenously developed 250 W Nd:YAG laser and by developing necessary tools and processes in a short time. Single crystals of β-Ga_2O_3 have been grown and characterized. The basic research using lasers has also been actively pursued. Experiments and studies, such as, electron acceleration using resonant transfer of energy to the electrons oscillating in plasma using a comparatively longer laser pulse; trapping of cold ^{87}Rb atoms and the lifetime measurement; studies to quantify the effect of nuclear radiation exposure on fiber Bragg gratings, and, the growth and studies of InAs nanostructures on Ge for next generation optoelectronic and microelectronic device applications, have been carried out. An anti-aggregation based calorimetric sensing technique using gold nanoparticles for detection of Hg^{2+} ions in water down to 50 ppb level has been demonstrated, which is important for the safe use of water. Laser shock peening experiments have demonstrated that the fatigue life of spring steel can be significantly enhanced by this technique.

A well-trained operation team plays a key role in round-the-clock operation of Indus accelerators. They undergo a comprehensive training programme in all aspects, from subsystem operation to safety procedures, of accelerator operation. The Licencing certificates were awarded to the third batch and those for the first and the second batch were renewed.

The panoramic surroundings with rich flora and fauna adds to the pleasure of working in a vibrant R&D Centre. Various initiatives, as well as dedicated efforts, are being made to preserve the natural beauty by keeping the campus clean and green. As a result, RRCAT's residential area has been declared as the cleanest one by Indore Municipal Corporation in its "Best among the Best" Swachhta Survey in the year 2017.

I would like to end by expressing my appreciation of the efforts made by the Editorial Board members to bring out the Newsletter in time.

With best wishes,

(P. A. Naik)
Director

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