



From the Director's Desk...

I am delighted to see that the first issue of this year's RRCAT Newsletter is ready for publication. This issue includes several reports highlighting Centre's achievements on R&D as well as other fronts during the second half of 2018.

The synchrotron radiation sources, Indus-1 and Indus-2, continue to operate in round-the-clock mode. During the year 2018, the facility operated for 329 days, with 36 days kept for maintenance and upgradation. The beam was available for about 7350 hours (nearly 22 hours per day) to the users of Indus-1 and 5533 hours (nearly 17 hours per day) for the users of Indus-2, which is nearly 6% higher than the number recorded during the last two years. With six Indus-1 beamlines and fourteen Indus-2 beamlines in operation, the number of users and the research outcome are increasing steadily. In all, 855 user experiments have been carried out in 2018, which is about 12% more than the number during the previous year. Similarly, 167 papers based on the work carried out on the Indus beamlines have been published in peer reviewed journals during 2018, which is about 23% more than number during 2017.

Technological developments, refinements and studies play an important role in continued operation of Indus-1 and Indus-2. Old power converters for electromagnets are being upgraded with the new ones with better stability, efficiency, reliability and maintainability. One of the *Theme Articles* highlights the improvement in the performance achieved with the implementation of transverse multi-bunch feedback system, which is a multi-disciplinary collaborative activity. The expertise gained in the design, development and characterization of electromagnets is being gainfully utilized to develop magnets for BARC to be used in mass spectrometers. A US patent for high voltage DC power supply has been granted. Couplers for qualification testing of 5-cell superconducting radio frequency cavities have been developed. Depositions of thin film of non-evaporable getters (NEG) using different sputtering gases has been carried out with an aim to develop NEG coated vacuum chambers in house. The BL-11 beamline of Indus-2 has been used to characterize structural properties of α -(Ga_xCr_{1-x})₂O₃.

In the area of lasers, the Centre has made laudable contributions. A laser based technique for sag measurement for reactor tubes, LASMART, has been developed and tested in KAPS-1 reactor to measure sag in the calandria tubes. A periscopic optical imaging systems has been developed and used to spot the leak location in the end shield tube sheet ligament of MAPS-1 reactor. After locating the leak, it was sealed. Generation of short-lived radioisotope ¹¹C, having important applications in positron emission tomography, has been demonstrated using 25 fs, 150 TW Ti:Sapphire laser accelerated proton and deuteron beam. Transparent ceramics, useful as laser gain medium, have been successfully fabricated and used for lasing. Following the silver nanoparticle assisted etching process, nanoporous and nanowire surfaces on silicon wafers have been produced, which may find several potential applications. There are two *Theme Articles* describing the optical techniques developed for imaging of the crystal growth process, and, generation and manipulation of laser cooled atoms. Another US patent has been granted for optical rare earth doped fiber long period grating based ionizing radiation dose sensor device. Similarly, technologies for *Raman probe* for *in situ* measurement of Raman scattering from biological tissues, and *TuBerculoScope* for diagnosis of tuberculosis, have been transferred to two private industries.

The Theme Meeting on Ultrafast Science, Workshop on Laser Additive Manufacturing and Allied Technologies, 27th DAE-BRNS National Laser Symposium and RRCAT Seminars organized in the Centre have once again proved to be important channels for exchange of scientific information. As a part of the National Apprenticeship Promotion Scheme under the "Skill India Campaign" of Government of India, a new scheme named "Trade Apprenticeship Scheme at RRCAT" (TASAR), having 35 apprentices, has been started.

My hearty congratulations to the winners of various individual and group achievement awards for the year 2017 under the DAE Excellence in Science, Engineering and Technology Awards Scheme. I also congratulate those who have been awarded Ph. D. degree by HBNI and won Best Thesis / Best Poster awards during the last six months.

I would like to end by expressing my appreciation of the efforts put in by the Editorial Board members in showcasing a wide spectrum of activities of our Centre and bringing out the Newsletter in time.

With best wishes,

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(P. A. Naik)
Director