Preface

The United Nations proclaimed the year 2015 as the International **Year of Light and Light-based Technologies (IYL 2015), recognizing the vital role that photonics plays in meeting a variety of global challenges**. By virtue of it being neutral, photons are easy to generate, manipulate and detect broadening the horizons of science and technology. Photonics–the technology of photons–probes fundamentals of science, enables worldwide communications, and provides healthcare solutions, to name a few. It encompasses a wide range of time scales, from attoseconds in ultrafast measurements to days in receiving images from space probes. Photonics also spans length scales from nanometers in cell imaging to kilometers in laser interferometers. Light manifests as a wave and a particle, allowing both classical and quantum aspects to be explored.

The cutting-edge research in Photonics requires scientists and engineers to work closely together in addressing challenges which are interdisciplinary in nature. At IIT Kanpur, research is being pursued in several key areas of photonics namely *fiber optics, nanophotonics, quantum optics*, *optical spectroscopy and imaging, biophotonics, and photonic devices.* Many of these activities are being carried out at the Centre for Lasers & Photonics (CELP)—an interdisciplinary research center with participation from departments across the institute. Hence, it is only appropriate that this special issue be dedicated to showcase the research activities in photonics at IIT Kanpur.

We identified the above mentioned areas and invited contributions from experts to obtain a contemporary perspective in photonics research. Although the articles in this issue capture the essence of various research activities in photonics, they are not exhaustive. The reader will find articles about coherent optical communications, novel photonic nanostructures, optical tweezers with nanoscale applications, quantum coherence and entanglement, photodiode arrays and quantum metrology. In addition, there are articles interdisciplinary in nature, such as cancer diagnostics with optical tomography, protein fluctuations at microsecond scale at single-molecule level, and visualization of motion in a droplet. We hope that these articles convey a broad picture of research in photonics at our institute that can also inspire the next generation of scientists and engineers.

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