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Editorial: Frontiers in lasers and applications

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Editorial on the Research Topic
Frontiers in lasers and applications

When the laser was invented in 1960 by Theodore H. Maiman, the potential applications of this apparatus were far from clear. Indeed, even 4 years later, Maiman himself, in an interview with *The New York Times*, called the laser "a solution seeking a problem."

Nearly 64 years later, it is safe to say that the laser's influence on our everyday lives has been nearly beyond measure. Lasers are integral to CD and DVD readers, barcode readers, many computer printers, speed and distance sensors, and in various entertainment systems used in concerts and other events.

Lasers have found countless uses in science and technology as well. Lasers enabled the transformation of telecommunications from a technology based around electronics to a technology based largely around optics. Laser-based spectroscopic techniques have vastly increased our understanding of matter, from atoms and molecules to materials. Lasers opened the door to performing clean mass-spectrometric analysis of large molecules. Lasers have revolutionized fluorescence imaging, and enabled remarkable improvements in the resolution of fluorescence and other microscopies. Lasers can be used to trap and manipulate microscopic objects, to cool atoms to remarkably low temperatures, and to store information in three dimensions at unrivaled densities.

Yet another key application of lasers is in the transformation of matter. Lasers can be used to drive both photochemical and photophysical processes in a manner that cannot be achieved by conventional energy sources. Lasers are used for materials-transformation processes as disparate as welding and surgery. Lasers can be used to remove materials in subtractive manufacturing and to deposit and/or transfer materials in additive manufacturing.

This Research Topic celebrates the use of lasers in cutting-edge applications in nanofabrication. Advances over the past two decades have paved the way for using tightly-focused laser beams to create 2D and 3D patterns with feature sizes and resolution that can be substantially smaller than the wavelength of the light employed. The articles in this Research Topic cover the nanopatterning of a broad array of materials, including metals, semiconductors, proteins, and colloidal crystals. These articles give a flavor of the sophistication that has been achieved in laser-based nanofabrication. The future of this field is indeed a bright one.

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Conflict of interest

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