From the first working laser until now—Part II

Javan, Basov, Hall, Holonyak, Zhores and others

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_In 1960, after the first working laser was made, Ali Javan (Fig.1),William Bennet Jr. and Donald Herriot succeeded in creating the first continuous wave laser using helium-neon stimulated by high voltage DC, producing 632,6 nanometer green light. Javan received the Albert Einstein Award in 1993. Together with Nikolai Basov Javan (Fig. 2) proposed the semiconductor laser concept in 1962. Basov was granted the Nobel Prize in Physics in 1964. In the same year, Alexander M. Prokhorov received the Nobel Prize for his pioneering work on lasers and masers.

Also in 1960, Peter P. Sokorin and Mirek J. Stevenson demonstrated a four stage solid state uranium laser at the IBM Thomas J. Watson Research Center.

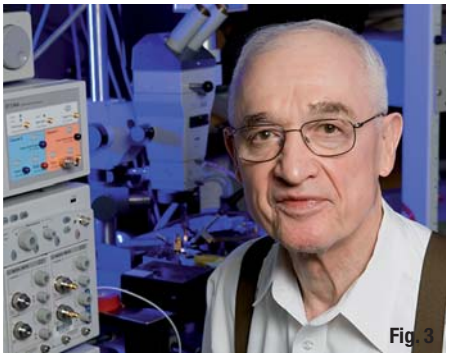
In 1961, Elias Schnitzler first combines laser with optical fibers and reports the first operating neodymium glass laser. In 1962, Robert N. Hall (Fig. 4) demonstrated the first laser diode device, made of gallium arsenide emitting in the near-infrared band of the spectrum at 850 nm. He retired in 1987 having been granted 43 US patents during his career. Hall was elected to the National Academy of Engineering in 1977, and to the National Academy of Sciences in 1978 and was inducted into the National Inventors Hall of Fame in 1994.

In December 1961 a human patient received the first laser medical treatment at the Columbia-Presbyterian Hospital in Manhattan, by Dr. Charles J. Campbell of the Hospitals Institute of Ophthalmology and Charles D. Koester of the American Optical Corporation.

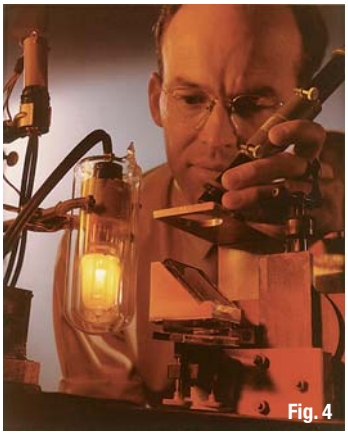
1961	Implementation of a combination of lasers and optic fibers by E. Snitzer.
1962	Development of a semiconductor laser by Robert N. Hall.
1964	Nobel Prize in Physics for Charles Townes, Nikolai Bassow and Alexander Prochorow for the development of Masers and Lasers. William B. Bridges develops the argon ion laser. J. E. Geusic realised the stimulated emission of the Nd:YAG. Stern und Sognnaes started to try to remove concrements with a rubin laser. C. Kumar Patel develops the CO_2 laser.
1974	Zharikov et al. presented the Er:YAG laser as a solid state laser with a wave length of 2,940nm.
1980er	Development of different pulsed laser systems.
1988	1st Congress of International Society of Laser Dentistry (ISLD, since 2006 WFLD—The World Federation for Laser Dentistry) .
1991	Foundation of Deutsche Gesellschaft für Laserzahnheilkunde e.V. (DGL).
1992	Implementation of Er:YAG laser to laser dentistry.
1997	FDA administration of the Er:YAG laser. It was the first laser which can be used for dentin in caries treatment.
2010	Happy Birthday Laser!


Fig. 1


Fig. 2


Fig. 3

In 1962, Nick Holonyak Jr. (Fig. 3) demonstrated the first semiconductor laser with a visible emission (LED). It could only be used in pulsed beam operation, and when cooled to liquid nitrogen temperature (77 K). Many colleagues have expressed their belief that he deserves the Nobel Prize for his invention of the LED. Holonyak commented: "It's ridiculous to think that somebody owes you something. We're lucky to be alive, when it comes down to it." Among other prizes like the Frederic Ives Medal of the Optical Society of America, Holonyak has been presented awards by George H.W. Bush, George W. Bush, Emperor Akihito of Japan and Vladimir Putin and in 1995, he was awarded the $500,000 Japan Prize for his outstanding contributions to research and practical applications of light emitting diodes and lasers. In 2008, he was inducted into the National Inventors Hall of Fame.


Fig. 4

The Neodymium laser was invented by Elias Schnitzer as the Nd:glass laser and first demonstrated by Joseph E. Geusic and Richard G Smith at the Bell Laboratories in 1962 as the yttrium aluminium garnet (YAG) laser. It became the most commonly used solid state laser. It is used for example for (endoscopic retrograde) surgery or metal melting and cutting in industry and dental laboratories. Also is appeared to be an excellent instrument for skin resurfacing and laser assisted in situ keratomileusis (lasik). To obtain a better beam quality the Nd:YAG laser could be pumped with diode lasers and in putting a KTP crystal in the laser beam, the frequency can be doubled, which means that the invisible near infrared Nd:YAG laser beam with 1,064 nm, then emits a visible green beam with 532 nm. These so called green light lasers, exist since 2002. Due to their absorption properties, an operator can perform precise and bloodless operations.

In 1964, William B. Bridges of the Hughes Research Laboratories discovered and patented the pulsed noble gas ion laser (argon, krypton, xenon). He was president of the Optical Society of America in 1988. He worked on many projects using lasers: an airborne night reconnaissance system (AN/AVD-3), space communications systems, early high power laser weapons (the carbon dioxide gas dynamic laser, now extinct), hydrogen maser clocks for the global positioning system. In 1977, Bridges became Professor of Electrical Engineering and Applied Physics at Caltech; then the Carl F Braun Professor of Engineering in 1983. He was president of the Optical Society of America in 1988.

Also in 1964, Stern and Sognnaes started investigations to remove caries with a ruby laser. As the absorption properties of the 694 nm ruby laser does not correspond well with the tooth material, and the results were very poor, later on, other lasers were tried for that purpose.

To be continued._

_contact laser

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