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**Press Release**
September 9, 2025

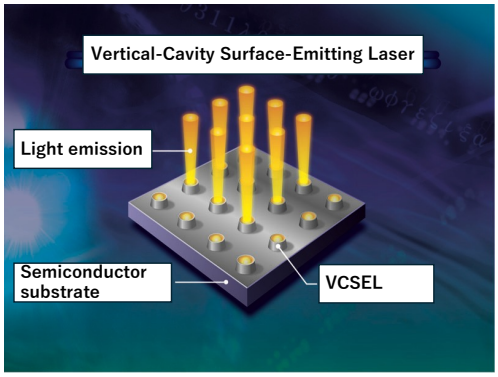
# The Honda Prize 2025 Awarded to Dr. Kenichi IGA

## —Pioneering contributions to the conception and development of Vertical-Cavity Surface-Emitting Laser (VCSEL), and leadership in its practical application—

The Honda Foundation is a public interest incorporated foundation established by Soichiro Honda and his younger brother Benjiro and is currently led by President Hiroto Ishida. In 1980, the foundation established the Honda Prize to acknowledge research achievements that contribute to "the creation of a truly humane civilization." Foreseeing the new potential of ecotechnology,[*1] the Honda Prize is Japan's first international award for scientific and technological achievements across a wide range of academic fields, encompassing the entire research process from discovery and invention to application and widespread usage. Laureates of the prize are leading figures who have created significant new value in science and technology through dedicated and pioneering research. The Honda Foundation contributes to solving social issues through recognizing and promoting of such valuable work.

**In 2025, the 46th Honda Prize will be awarded to Dr. Kenichi Iga (Honorary Professor at Institute of Science Tokyo and 18th President of former Tokyo Institute of Technology), for his conception of Vertical-Cavity Surface-Emitting Laser (VCSEL)[*2] in 1977 and pioneering basic research. The VCSEL is a prime example of ecotechnology in the laser field, featuring smallest size, reduced power consumption, high speed, and continuous wavelength tuning.**

**Dr. Iga has made significant contributions to the spread and development of VCSEL through his promotion of basic research and the creation of new technologies that have led the way to practical application.**



VCSEL Array


3D facial recognition system using VCSEL[*3]


Laser mouse with VCSEL
Source: BUFFALO INC.

**＜Reason for the Prize＞**

Following the establishment of the fundamental technology, a series of VCSEL developments were undertaken toward the realization of practical devices grounded in the original ideas conceived by Dr. Iga. This work has been highly regarded internationally as a pioneering innovation of Japanese origin. However, the early ideas were met with skepticism from both academia and industry, with concerns raised about its feasibility and practicality. It was Dr. Iga and his team's long-term research and persistent promotion of its technical significance that eventually led to the concept gaining worldwide recognition. Their perseverance demonstrates the ideal attitude for researchers in the engineering field. Because we believe that VCSEL will continue to contribute to the creation of further ecotechnology, we will award the 46th Honda Prize to Dr. Iga.

**The award ceremony will be held at the Imperial Hotel in Tokyo, Japan on November 17, 2025. In addition to the prize medal and diploma, the laureate will be awarded a total of 10 million yen.**

*1 Ecotechnology: Human-friendly philosophy founded on science and technology and designed to harmonize the natural and human environments and find resolutions to social issues, adopting a methodology that implies something more than just "being friendly to the Earth," which is the meaning usually associated with the word "ecology."

*2 Prof. Iga and his mentor, Prof. Yasuharu Suematsu, originally called this naming a Surface-Emitting Laser. To distinguish it from other types of surface-emitting lasers, Bell Laboratories began using Vertical-Cavity Surface-Emitting Laser for this technology at the end of the 1980s.

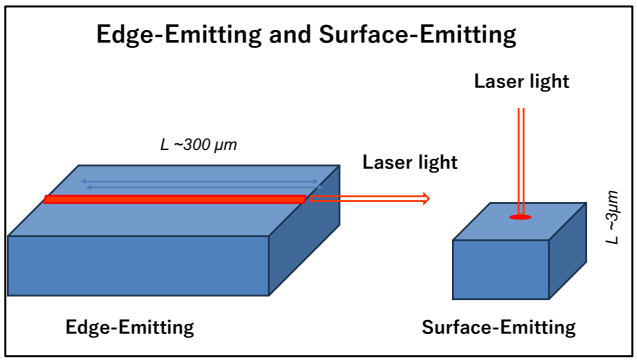
*3 Apple products and services are registered trademarks of Apple Inc.

**◎ What is VCSEL?**

Semiconductor lasers are small diodes with sides less than a millimeter in length. They are laser oscillator[*3] that operate under similar power conditions as a typical electronic circuit. Semiconductor lasers are widely used in our daily lives; for example, in optical fiber communications and in DVD disc-reading mechanisms. VCSEL was developed as a semiconductor laser but with its resonator attached vertically to the substrate. Compared with a conventional Edge Emitting Laser (EEL), VCSEL is more compact and produces less interference among neighboring modes, enabling high density integration. Because of these exceptional characteristics, they can be formed into arrays of 100 or more diodes on a chip of one square millimeter. VCSEL also features stable single-wavelength oscillation, easy mass production, continuous wavelength tuning, and low power consumption. With these features, VCSEL has brought about innovative developments in the field of optoelectronics, such as high speed and large volume data communications, fiber-optic communications over optical interconnect cables, energy-saving devices, 3D facial recognition, computer mouse operations, gas detection, LiDAR in self-driving cars and vacuum cleaners (a laser technology to measure distance and identify shapes).

**◎ Laureate's research history and achievements**

The first EEL pulsed oscillation at low temperatures was achieved in 1962. This was the dawn of laser technology, even before a technology to produce laser mirrors had been established. Only three years later in 1965, Dr. Ivars Melngailis at M.I.T. reported observation of pulse oscillation of a surface emitting laser that emitted light vertically to the substrate at low temperatures. In this design, both sides of the substrate had an evaporated metal coating and were used as reflecting mirrors. Dr. Melngailis also described the future of the surface emitting laser, including the possibility of 2-dimensional arrays and output power enhancement. However, his suggestions did not lead to today's mainstream short-cavity surface-emitting laser due to the use of thick active layers. Since the cleaving method[*4] for producing laser mirrors had been established, Dr. Melngailis's research did not continue. With practical application requiring continuous oscillation at room temperature, researchers' interests were concentrated mostly on EEL development. Against this backdrop, around 1970, Dr. Zh. I. Alferov of the Ioffe Institute in the then U.S.S.R., and Dr. Izuo Hayashi and Dr. Morton B. Panish of Bell Laboratories in the United States independently reported continuous-wave oscillation at room temperature from edge-emitting lasers.




By the mid 1970s, along with the arrival of optical fiber, semiconductor laser development aiming at practical applications in optical communications was progressing in corporations and laboratories across Japan, Europe, and the U.S. EEL, which was the mainstream technology at that time, optically resonates parallel to the substrate surface. However, Dr. Iga felt that EEL may face its own drawback, such as being unsuitable for mass production due to its complicated production process, which included cleaving and mirror coating, an unstable multi-wavelength oscillation, and inconsistent reproducibility.

To solve these three issues, in 1977 Dr. Iga independently conceived the idea of a short-cavity laser in which the resonator was situated vertical to the substrate and named it the (Vertical-Cavity) Surface-Emitting Laser with advice from his mentor, Prof. Yasuharu Suematsu. This was a novel idea of raising a horizontal laser to the vertical and making it short. In 1978, Dr. Iga presented his innovative concept and production process at an academic conference and published a related paper. However, people did not value his idea considering it an attractive concept but one that could not be realized. Even so, Dr. Iga was convinced of its potential and persisted in his research despite facing many difficulties. At the same time, he continued to actively promote the significance of his concept through lectures and presentations in Japan and overseas. In 1988, his commitment and the ceaseless efforts of successive members of his research team finally bore fruit—Dr. Fumio Koyama, who later became Professor of former Tokyo Institute of Technology, now Institute of Science Tokyo, successfully achieved continuous-wave operations at the room temperature for the first time anywhere in the world. This breakthrough set the course for the practical application of VCSEL.

Since the late 1990s, VCSEL has been commercialized through research and development by numerous corporations, driven by growing global interest. VCSEL has transformed our daily lives through wide range of application, including high-speed and large-volume parallel communications in data centers and on LANs, energy conservation, 3D facial recognition on smartphones, and incorporation within LiDAR. Many researchers across the globe are now focusing on VCSEL and more than 60,000 related papers have been published to date. Today VCSEL plays a significant role as a key concept in the development of optoelectronics.

*4 A state in which a wave at a certain frequency continuously occurs when waves emitted from an amplifier are fed back to the amplifier (feedback). This phenomenon may be regarded to a kind of phase change.

+ In the case of sound: The sound emitted from a speaker is picked up by a microphone, and this is amplified and emitted again, causing feedback howling.

+ In the case of laser oscillation: This refers to a situation when the light emitted from an atom or semiconductor sandwiched between two reflecting mirrors is amplified by the reflection, and when the attenuation of the light going back and forward between the mirrors reaches a threshold point, suddenly light resonating at a certain single wavelength occurs continuous wave oscillation.

*5 A method to produce a flat and smooth mirror surface by splitting the crystal along its plane.

**＜Details of achievement commentaries and past Honda Prize laureates＞**

For your reference, please see the Honda Foundation official website.

Official Website：https://www.hondafoundation.jp/en/index.html

Achievement Commentary: https://www.hondafoundation.jp/commemoration/index_en/285

Honda Prize Laureates: https://www.hondafoundation.jp/en/winner.html

**[The Honda Foundation]**

The Honda Foundation was established in December 1977 with a donation from Soichiro Honda, the founder of Honda Motor Co., Ltd., and his younger brother, Benjiro. The Foundation defines approaches to resolve issues by harmonizing the human and natural environments in "ecotechnology." The Foundation focuses on the following three activities to develop and disseminate ecotechnology.

(1) Honda Prize: An international award that acknowledges significant achievements in the field of ecotechnology
(2) International symposia and colloquia: Providing opportunities for extensive discussions into various issues of modern society to search for resolutions
(3) Honda Y-E-S Program: Various programs designed to develop young talented engineers and scientists for the next generation

The Foundation aims to contribute to “the creation of a truly humane civilization“ through these activities.

**＜For inquiries＞**

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# Dr. Kenichi Iga

Honorary Professor, Institute of Science Tokyo
18th President of former Tokyo Institute of Technology

## Born

June 15, 1940 - Hiroshima, Japan

## Biography

| | |
|---|---|
| 1963 | B. Eng., Tokyo Institute of Technology |
| 1968 | Dr. Eng., Tokyo Institute of Technology |
| 1968 | Assistant Professor, Tokyo Institute of Technology |
| 1973 | Associate Professor, Tokyo Institute of Technology |
| 1979-1980 | Guest Researcher, Bell Laboratories |
| 1984-2001 | Professor, Tokyo Institute of Technology |
| 1995-1999 | Director, Precision and Intelligence Laboratory, Tokyo Institute of Technology |
| 2000 | Director, Library of Tokyo Institute of Technology |
| 2001 | Professor Emeritus, Tokyo Institute of Technology |
| 2001-2007 | Executive Director, Japan Society for the Promotion of Science |
| 2003-present | Chair, Microoptics Group, Japan Society of Applied Physics |
| 2003-2004 | President, Institute of Electronics, Information and Communication Engineers |
| 2007-2012 | President, Tokyo Institute of Technology |
| 2022 | Honorary Professor, Tokyo Institute of Technology |
| 2024 | Honorary Professor, Institute of Science Tokyo |

## Member of Academic Societies

IEICE Honorary Member, Fellow
JSAP Distinguished Member, Fellow
Laser Society of Japan Fellow
IEEE Life Fellow/ OPTICA Life Fellow/NAE Foreign Member

## Honors

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|---|---|
| 2000 | Tokyo Metropolitan Government Merit Award (Technology Promotion Merit) |
| 2001 | Purple Ribbon Medal |
| 2007 | Machida City Merit Award (Culture and Arts Merit) |
| 2013 | Machida City Citizen Honor Award |
| 2018 | The Order of the Sacred Treasure, Gold and Silver Star |
| 2021 | Machida City Honorary Citizen |
| 2022 | Person of Cultural Merit (MEXT) |

## Prizes

1990 Ichimura Foundation for New Technology, Ichimura Prize for Science and Technology (Lifetime Achievement Award)
1993 IEEE/LEOS, William Streifer Award
1995 Toray Science Foundation, Science and Technology Prize
1998 IEEE/LEOS+OSA, John Tyndall Award
1998 Asahi Foundation, The Asahi Prize
2002 The Rank Foundation (UK), The Rank Prize
2003 Institute of Electronics, Information and Communication Engineers, Lifetime Achievement Award
2003 Fujiwara Science Foundation, The Fujiwara Prize
2003 IEEE, Daniel E. Noble Award
2006 Japan Society of Applied Physics, Achievement Award
2007 NEC C&C Foundation, The C&C Prize
2009 NHK Foundation, NHK Broadcast Cultural Award
2013 Franklin Institute, Franklin Medal/Bower Award for Science
2021 IEEE, Edison Medal
2024 OPTICA, Frederic Ives Medal/Jarus Quinn Prize
2024 Okawa Prize