Shuji Nakamura

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Shuji Nakamura (中村 修二 *Nakamura Shūji*, born May 22, 1954) is a Japanese-born American electronic engineer and inventor specializing in the field of semiconductor technology, professor at the Materials Department of the College of Engineering, University of California, Santa Barbara (UCSB),[5] and is regarded as the inventor of the blue LED, a major breakthrough in lighting technology.[6] Together with Isamu Akasaki and Hiroshi Amano, he is one of the three recipients of the 2014 Nobel Prize for Physics "for the invention of efficient blue light-emitting diodes, which has enabled bright and energy-saving white light sources".

Contents

Shuji Nakamura

Shuji Nakamura in 2014

Born	22 May 1954 Ikata, Ehime, Japan
Residence	United States
Citizenship	Japan (until 2005 or 2006) United States (since 2005 or 2006)[1][2]
Nationality	American[3][4]
Institutions	University of California, Santa Barbara
Alma mater	University of Tokushima
Known for	Blue and white LEDs
Notable awards	Millennium Technology Prize (2006) Harvey Prize (2009) Nobel Prize in Physics (2014) National Inventors Hall of Fame (2015)

Career

Nakamura graduated from the University of Tokushima in 1977 with a B.Eng. degree in electronic engineering, and obtained an M.Eng. degree in the same subject two years later, after which he joined the Nichia Corporation, also based in Tokushima. It was while working for Nichia that Nakamura invented the first high brightness gallium nitride (GaN) LED whose brilliant blue light, when partially converted to yellow by a phosphor coating, is the key to white LED lighting, which went into production in 1993.

Previously, J. I. Pankove and co-workers at RCA put in considerable effort, but did not manage to make a marketable GaN LED in the 1960s. The principal problem was the difficulty of making strongly p-type GaN. Nakamura drew on the work of another Japanese group led by Professor Isamu Akasaki, who published their method to make strongly p-type GaN by electron-beam irradiation of magnesium-doped GaN. However, this method was not suitable for mass production and its physics were not well understood. Nakamura managed to develop a thermal annealing method which was much more suitable for mass production. In addition, he and his co-workers worked out the physics and pointed out the culprit was hydrogen, which passivated acceptors in GaN.

At the time, many considered creating a GaN LED too difficult to produce, therefore Nakamura was fortunate that the founder of Nichia, Nobuo Ogawa (1912–2002) was initially willing to support his GaN project. However the company eventually ordered him to suspend work on GaN, claiming it was consuming too much time and money. Nakamura continued to develop the blue LED on his own and in 1993 succeeded in making the device.[7]

He was awarded a D.Eng. degree from the University of Tokushima in 1994. He left Nichia Corporation in 1999 and took a position as a professor of engineering at the University of California, Santa Barbara.

In 2001, Nakamura sued his former employer Nichia over his bonus for the discovery as a part of a series of lawsuits between Nichia and Nakamura with Nichia's US competitor Cree Inc.; they agreed in 2000 to jointly sue Nichia at the expense of Cree and Nakamura received stock options from Cree. Nakamura claimed that he received only ¥20,000 (≈US$180) for his discovery of "404 patent," though Nichia revealed that the company awarded him with promotions and bonuses of 62 million yen over 11 years and his annual salary reached 20 million yen when he quit Nichia.[8]

Although Nakamura originally won an appeal for ¥20 billion (≈US$180 million), Nichia appealed the award and the parties settled in 2005 for ¥840 million (≈US$9 million), at the time the largest bonus ever paid by a Japanese company.[9]

Nakamura has also worked on green LEDs, and is responsible for creating the white LED and blue laser diodes used in Blu-ray Discs and HD DVDs.[10]

Nakamura is a professor of Materials at the University of California, Santa Barbara, and holds over 100 patents.[11] In 2008, Nakamura, along with fellow UCSB professors Dr. Steven DenBaars and Dr. James Speck, founded Soraa, a developer of solid-state lighting technology built on pure gallium nitride substrates.[12]

Recognition

- 2001 awarded Asahi Prize from the Japanese Newspaper, *Asahi Shimbun*
- 2002 awarded the Benjamin Franklin Medal in Physics from the Franklin Institute.
- 2006 awarded Finland's Millennium Technology Prize for his continuing efforts to make cheaper and more efficient light sources.[13][14]
- 2007 nominee for the European Inventor Award awarded by the European Patent Office [15]
- 2008 won the Prince of Asturias Award for Technical and Scientific Research.[16]
- 2008 awarded an honorary degree of Doctor of Engineering from Hong Kong University of Science and Technology.
- 2009 received the Harvey Prize[17] from the Technion in Israel.
- 2012 named Silicon Valley Intellectual Property Law Association (SVIPLA) Inventor of the Year.[18]
- 2014 received the Nobel Prize in Physics together with Prof. Isamu Akasaki and Prof. Hiroshi Amano for inventing blue light-emitting diodes.[19]
- 2015 received the Global Energy Prize for the invention, commercialization and development of energy-efficient white LED lighting technology [20]

References

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2. ノーベル賞の中村修二氏、「アメリカの市民権」を取った理由を語る [Nobel prize winner Shuji Nakamura talks about why he acquired U.S. citizenship] (in Japanese). withnews. 18 October 2014. "２００５、６年ごろに（米国市民権を）取ったんですよ [acquired (U.S. citizenship) in 2005 or 2006]"
3. "中村教授「物理学賞での受賞には驚いた」　ノーベル賞". *The Nikkei* (Nikkei Inc.). October 2014.
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7. "Court dismisses inventor's patent claim but will consider reward". *The Japan Times*. September 20, 2002. Archived from the original on October 7, 2014. Retrieved October 7, 2014.
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15. Inventor Shuji Nakamura at the European Inventor Award (http://www.epo.org/learning-events/european-inventor/finalists/2007/nakamura.html)
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18. "SVIPLA Presents Inventor of the Year - Shuji Nakamura, Ph.D.". Silicon Valley Intellectual Property Law Association. Retrieved 5 March 2013.
19. "The 2014 Nobel Prize in Physics - Press Release". *Nobelprize.org*. Nobel Media AB 2014. Retrieved October 7, 2014.
20. http://globalenergyprize.org/en/laureates/2015

Further reading

- Shuji Nakamura, Gerhard Fasol, Stephen J. Pearton, *The Blue Laser Diode : The Complete Story*, Springer; 2nd edition, October 2, 2000, (ISBN 3-540-66505-6)
- Bob Johnstone *Brilliant!: Shuji Nakamura and the revolution in lighting technology*, Prometheus Books, 2007 ISBN 1-59102-462-5

See also

- List of Japanese Nobel laureates

External links

- Professor Nakamura's home page at UCSB (http://web.archive.org/web/20100824053139/http://www.sslec.ucsb.edu:80/nakamura/)
- The Solid State Lighting and Energy Center at UCSB (http://www.sslec.ucsb.edu/)
- Shuji Nakamura Wins $188.7 Million Settlement from Former Employer Nichia for Blue Spectrum Breakthrough Technology (http://www.compoundsemi.com/documents/articles/news/3693.html)
- New York Times article on Nakamura's settlement with Nichia (http://www.nytimes.com/2005/01/12/business/worldbusiness/12light.html?oref=login)
- U.S. Patent 6,900,465 (https://www.google.com/patents/US6900465) — Nitride semiconductor light-emitting device
- Shuji Nakamura wins the 2006 Millennium Technology Prize (http://www.technologyawards.org//)
- Nichia's Shuji Nakamura: Dream of the Blue Laser Diode (https://web.archive.org/web/20040622084207/http://www.sciencewatch.com/jan-feb2000/sw_jan-feb2000_page3.htm)
- 2008 Prince of Asturias Award For Technical and Scientific Research (http://www.fundacionprincipedeasturias.es/en/awards/2008/cientificos-que-lideran-en-el-mundo-la-creacion-de-nuevos-materiales-al-servicio-de-la-humanidad-1/)
- Harvey Prize (http://www.admin.technion.ac.il/harvey/)
- Shuji Nakamura SPIE Photonics West plenary presentation: Future and present technologies of solid state lighting (http://spie.org/x112671.xml)

Preceded by **Tim Berners-Lee**	**Millennium Technology Prize winner** 2006 (for blue and white LEDs)	Succeeded by **Robert S. Langer**

Categories: 1954 births | Living people | Japanese academics | Japanese engineers | Japanese inventors | Tokushima University alumni | University of California, Santa Barbara faculty | Light-emitting diode pioneers | Members of the United States National Academy of Engineering | American Nobel laureates | Japanese Nobel laureates | Draper Prize winners | Japanese emigrants to the United States | American academics of Japanese descent | American scientists of Japanese descent