

Honorary Doctor of Science

Professor Hiroshi Amano



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Mr Pro-Chancellor:

Professor Hiroshi Amano, Professor and Director of the Center for Integrated Research of Future Electronics, Institute of Materials and Systems for Sustainability at Nagoya University, was awarded the Nobel Prize in Physics together with Professor Isamu Akasaki and Professor Shuji Nakamura in 2014 for the invention of efficient blue light-emitting diodes (LEDs). Better known as blue LEDs to laypeople, this game-changing invention enabled bright and energy-saving white light sources and sparked the second lighting revolution. Nowadays, the technology of blue LEDs finds its application in many fields, including display monitors, such as the ones we see on televisions, smartphones, and computers.

Born in Hamamatsu in Shizuoka Prefecture, Japan, Professor Amano's academic research journey began at Nagoya University, where he received his Bachelor's, Master's and Doctoral degrees in Engineering. The research topic of his graduating thesis was Gallium Nitrate (GaN), a material that would significantly contribute to the development of blue LEDs. Professor Amano's early work was hampered by the insufficiently funded and inadequately equipped laboratories at the time. Japan had not yet developed the funding model found universally in higher education all over the world today. The Japanese private sector at that time was more ready to support foreign research institutions than those in Japan. The only form of donations Professor Amano could obtain from private companies were the used spare parts they rejected.

For the rest, he had to rely on his resourcefulness to improvise, such as making coils by hand from beer bottles. Notwithstanding such unfavourable odds, Professor Amano made the world's first blue LED in 1989.

Professor Amano attributes his success to his curiosity, persistence and positive mindset, qualities that he hopes young scientists will learn to develop. He always considers new possibilities and is ready to do three experiments, while others will only consider one. According to him, no effort is ever wasted; even when an experiment fails, it lays the seeds for the next step. As he put it in an interview, he always has an image of success, which provides the drive that keeps him going.

Similarly, he believes fostering independent thinking in his young colleagues is essential. Contrary to the strong hierarchical order characteristic of many Asian organisations, Professor Amano inculcates a spirit of equality in his laboratory, in part because the research that he leads is at the cutting edge, so much so that they are venturing into territories that are new to practically everybody on the team and no individual can claim absolute authority over their field of study. Therefore, the researchers must develop a critical habit of mind so that they dare challenge themselves and their seniors.

Today, the use of blue LEDs has gone beyond optoelectronics. They have found ready applications in water purification and reducing air-borne microbiological contamination in outer space and marine situations. LEDs are also used in the medical field, where they have been found to be effective in administering cancer therapy and treating skin conditions. Meanwhile, Professor Amano and his teams are exploring other ways to change the world, such as using ultra-wide bandgap semiconductors, where GaN has a role to play, to achieve net-zero emissions by 2050 in Japan. Additionally, they are investigating micro-LED displays for future human-internet interfaces whereby one can interact with electronic devices employing human brainwave. All these efforts will benefit more people, which is the purpose that underlies all of Professor Amano's research.

In 2014, Professor Amano received the Japanese Order of Culture. He is a Fellow of the Engineering Academy of Japan, a Foreign Member of the Chinese Academy of Engineering, and an International Member of the National Academy of Engineering in the United States. In addition, he was awarded Honorary Doctorate degrees from universities all over the world and has received numerous awards and accolades.

Mr Pro-Chancellor, as a student at Nagoya University, Professor Hiroshi Amano once had the Chinese character “ 工 ” which the Japanese use as a short-hand reference to the study of engineering, explained to him. The character resembles a bridge, representing the connection between people. Therefore, the purpose of the study of engineering is to enrich people’s lives. It is a vision that Professor Amano maintains today. His career is fraught with challenges, which he overcomes with diligence, persistence, and optimism. He is an excellent teacher and a wonderful colleague. City University of Hong Kong is proud to be associated with such an illustrious scientist as Professor Hiroshi Amano. It is my pleasure to present him to you for the conferment of the degree of Doctor of Science, *honoris causa*.