OBITUARIES

Isamu Akasaki

Isamu Akasaki, a 2014 Nobel laureate in physics who brought highly efficient general lighting for the 21st century to people all over the world, passed away on 1 April 2021 in Nagoya, Japan, at age 92.

Akasaki was born on 30 January 1929 in Chiran, Kagoshima, in the southern part of Japan. When he was a child, his father gave him ore specimens that started his strong interest in crystals. He graduated from the Faculty of Science at Kyoto University with a BS degree in 1952. He then joined Kobe Kogyo Corp, where he developed fluorescent materials for the surfaces of cathode-ray tubes. That was his first encounter with luminescence without heat.

In 1959 Akasaki joined Nagoya University as an assistant professor working under Tetsuya Arizumi. There he was intoxicated by the allure of germanium crystal growth. In 1964 he received his doctorate of engineering from Nagoya with a thesis titled "Vapor phase epitaxial growth of Ge."

Akasaki moved to the Matsushita Research Institute Tokyo in 1964. There he became one of the principal investigators of R&D projects and encountered LEDs. His group was instrumental in the commercialization of gallium phosphide–based green and red LEDs. That achievement, however, left him unsatisfied because he thought he was merely following the pioneering work done in the US and Europe. He therefore started nitride research in 1967, initially focusing on aluminum nitride as a cathodoluminescence material. He started growing gallium nitride crystals by molecular-beam epitaxy (MBE), at that time a new crystal-growth technology.

Several group members strongly objected to Akasaki's choice of MBE. Despite that opposition, the Ministry of International Trade and Industry provided funding for Akasaki to set up a test project in 1974. He was able to merely observe blue cathodoluminescence from MBE-grown GaN and could not fabricate LEDs. After the project, he shifted his focus to vapor-phase growth using halogens—so-called halide vapor-phase epitaxy—and succeeded in creating a metal-insulator-semiconductor prototype blue LED.

But Akasaki still thought the development of the blue LED followed the LED invented by Jacques Pankove, Herbert Maruska, and their group members at RCA and Stanford University. After his success, Akasaki wanted to continue research to establish an original blue LED. Unfortunately, the people at the top of Matsushita did not listen to him and decided to stop research on blue LEDs. So Akasaki made up his mind to move in 1981 to Nagoya University, where he developed a new crystal-growth method, metal-organic vapor-phase epitaxy. At that time, few other organizations in the world were continuing to explore GaN. Most researchers considered it to be extremely difficult to grow GaN single crystals and impossible to grow p-type GaN, so many of them abandoned such studies. According to Akasaki, his situation was like "going alone into the wilderness," although I think that as a pathfinder who sought frontier research fields, he probably enjoyed it.

Akasaki gave several lectures to the public before and after receiving the Nobel Prize. After presentations, young researchers sometimes asked him, "I cannot decide my research subject. Could you help me?" He always answered by saying, "If you are wondering what to do, do what you want to do." That answer really epitomized him perfectly. He always wanted to be a trailblazer of fields where no one had been before. I believe that aspect of his personality came from his experience; he always followed his interest and passion.

Akasaki empowered young people not only by giving them advice but also by setting up awards especially for the younger generation. In 2010 he donated the money he received the previous year as a Kyoto Prize recipient and established the Nagoya University Akasaki Award, for which awardees must be 35 or younger. He also established awards presented by the Japan Society of Applied Physics and the Japanese Association for Crystal Growth.

According to the Nobel Foundation, Akasaki's contributions "hold great promise for increasing the quality of life for over 1.5 billion people around the world who lack access to electricity grids." Now GaN is seen not only as an LED material but also as a key component for laser diodes and high-frequency devices that will help in achieving carbon neutrality and realizing 5G and post-5G wireless communications systems. The "wilderness" in which Akasaki made his home has now been cultivated into a prosperous and fruitful field that many researchers around the globe are harvesting to bring happiness to people worldwide. As one of his young researchers, I thank the true pioneer Isamu Akasaki for leaving us his wonderful legacy.

Isamu Akasaki

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