# The Inventor's Vision

*In December 2010, Toshiba, a major electric appliance company, released the world's first 3-D television that can be viewed without the need for special glasses. The leader behind the development of this breakthrough technology was* ***Rieko Fukushima****, senior research scientist at Toshiba Corporation Corporate Research and Development Center. Fukushima has risen to prominence as a result of this achievement, receiving both the 21st Century Invention Prize and the Nikkei Woman of the Year prize in 2010, as well as numerous other prizes. In this interview, she talks to the* Japan Journal*'s Osamu Sawaji.*

## What sparked your interest in science?

**Rieko Fukushima:** In Japan there is a strong tendency for men to be the ones who go on to study science at university, but I didn't want to be influenced by this kind of tendency. To be honest, I wasn't really any better at math and physics than English or Japanese, but I didn't want to just give up either. It wasn't so much that I was interested in science—I simply had a strong desire to understand what was written in the textbooks.

## You joined Toshiba in 1995 after doing postgraduate research in organic chemistry. What did you research in the beginning?

I wanted to work as a company researcher after I finished my post-graduate studies, because I thought it would be motivating to have the results of my research find their way into products that reach users. In the beginning, I researched liquid crystal materials for use in LCD displays. The senior researchers I was working with were all so talented, and it was a daily struggle as I fumbled around trying to come up with something worthwhile. I spent all my time in the clean room and the lab, not going home until the last train.

But at least my private life was going well. I got married at the age of twenty-nine and at age thirty I gave birth to a daughter and took a year off for maternity leave.

I enjoyed looking after my daughter, but having to adjust my lifestyle to suit the demands of a child was extremely difficult. I thought back to the time at work when I was asked, "What do you want to do? Please make a suggestion if there is something that you want to do." Then I realized that, unlike at home, at work I could do the things that I wanted to do.

When I returned to work in 2002, my boss suggested that I work on 3-D research.

## Were you a little unsure?

To be honest, I wondered why they wanted me to work on 3-D when all my previous research had been on materials. But apparently my boss put my name forward because he thought that I was interested in the entire product system, not just materials, and because he was fairly sure that I would do something interesting in the 3-D area.

Actually, it was about six months after I joined the 3-D research team that we made the discovery that led to the commercialization of glasses-free 3-D. I was in a meeting but I was having trouble concentrating on the topic, and so I was thinking about something else [laughs]. That's when I came up with the idea.

3-D displays that can be viewed without special glasses had already been developed, but the viewer could only see true 3-D images from within an extremely narrow range of positions, which made it impossible to commercialize the technology. The 3-D image disappeared as soon as you moved your head even slightly. I realized that the reason for this was because the viewer could not get the light beams coming from the display that were needed to view the 3-D image correctly. So we worked on improving the display resolution so that more of the light beams for the 3-D image would be directed towards the viewer.

## So that was the start of glasses-free 3-D?

That was the "springtime" of research and development. I really enjoyed working as part of a very small research and development team and participating in the creation of the blueprint of Toshiba's 3-D—something that no one had ever sketched out before. Then in about 2005 it was formally decided that the product would be commercialized, and we suddenly had a lot more team members. But we also had to think about how to switch to mass production while still maintaining quality and producing a profit at the same time. I had to finish work by 5 o'clock so that I could pick up my daughter from day care,

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Rieko Fukushima, senior research scientist at Toshiba Corporation Corporate Research and Development Center in front of the glasses-free 3-D she helped develop.

so I received a lot of help from my family and other team members. Ever since then my husband has been in charge of cooking breakfast.

## What do you do for relaxation?

When I'm with my daughter, I totally forget my work and research. My husband is a university researcher, and there are a lot of researchers like him that think about their research day and night, but I'm not like that. I also love munching away on potato chips and other snacks [laughs].

## What would you like to work on now?

I would like to do the kind of research that our descendants will thank us for many years from now. My daughter is in elementary school, and she once asked me, "When we can't live on Earth any more, are there any other planets where we can live?" I've thought for a while now that the era of mass production and mass consumption can't go on forever, but I wouldn't be surprised if a lot more people in Japan feel this way since the Great East Japan Earthquake. I'm currently involved in making products with lower environmental impact, which feels very rewarding and worthwhile. HJ