Prof. Seiji Samukawa Research Activity

Seiji Samukawa

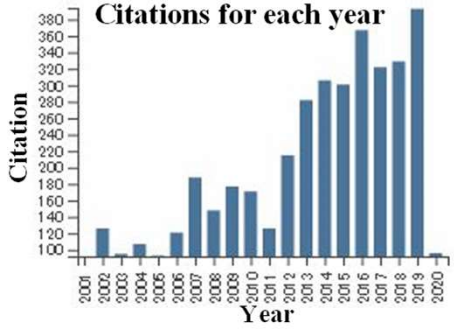
"S. Samukawa"

Professor - Institute of Fluid Science, Tohoku University

Web of Science ResearcherID
L-2719-2018

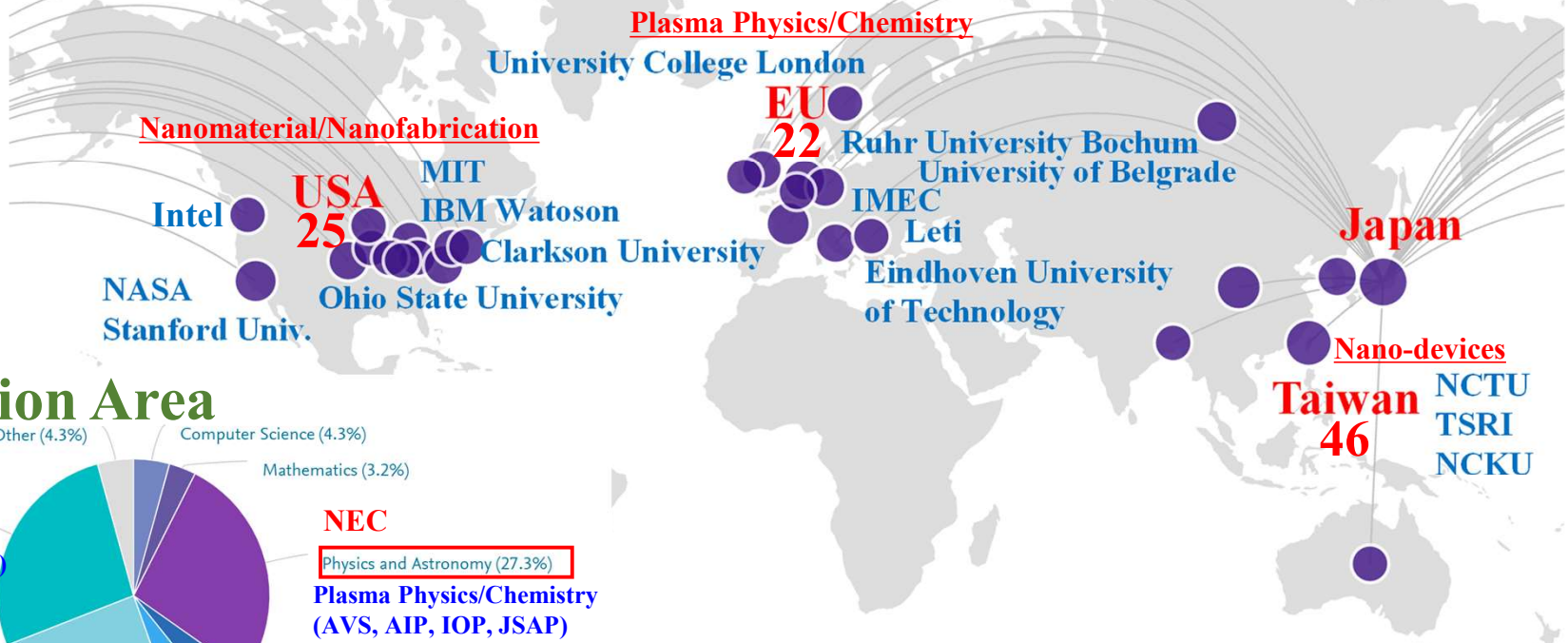
PUBLICATIONS	TOTAL TIMES CITED	H-INDEX	VERIFIED REVIEWS	International Conference
300	5054	33	5	528

(Plenary/Key/Invited Talk:132)

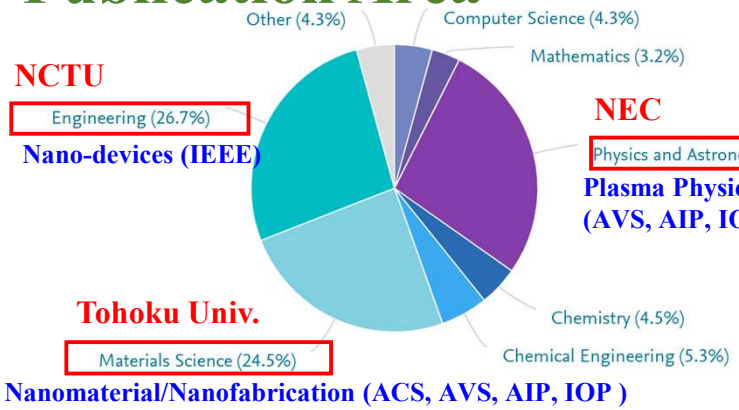


International Joint Paper:30%

Global Research Network



Publication Area



Fusion between Physics, Chemistry, Nanotechnology and Devices (Invited talks for consecutive past 31 years in various field conferences)

“Technology is meant to be disseminated—Innovation occurs when technology flows”

Seiji Samukawa, Tohoku University

“Technology leak” is a familiar expression in Japan, but technology is something that has to be disseminated. Being the first in the world to disseminate new technology results in the accumulation of information and techniques from the outside world that gives rise to innovation. That is, innovation occurs when people freely exchange the knowledge they possess. My own research has progressed through the knowledge that I possess and by searching for places where I can brainstorm with others.

I began my career at a private company (the world’s top semiconductor manufacturer). There, with the aim of developing advanced plasma etching equipment, I made my way from the downstream side to the upstream side of technology development moving from the business division to Tsukuba Research Laboratories. As part of my research activities there in a free and vigorous environment, I interacted and collaborated with plasma researchers in Europe—historically known as a research center in the plasma field—as well as those in the United States and Japan. As a result of these efforts, I came to invent pulse-modulated plasma, which currently accounts for 50% of worldwide plasma etching equipment in semiconductor manufacturing. During this time, I also obtained my university doctorate.

In the 1990s, Japanese semiconductor manufacturers began to outsource a good portion of semiconductor materials production and manufacturing equipment technology. This meant forsaking original and fundamental technology development in this field, and as a result, the technological power of Japanese semiconductor manufacturers unfortunately declined. I lost much of my motivation to research and develop at that time, but thinking that the research and development of manufacturing technology served as a foundation for a country, I decided to continue my research at Tohoku University, which at that time was also a hub of semiconductor and materials in

Japan. At the Institute of Fluid Science, Tohoku University, I came to invent neutral particle beam technology and conducted diverse research in fundamental nanotechnology technologies such as nanoprocesses, nanomaterials and nanodevices. During this time, I collaborated with Advanced Institute for Materials Research (AIMR) at Tohoku University and National Institute of Advanced Industrial Science and Technology (AIST) in Tsukuba and with international institutions as well centered about the United States (IBM Thomas J. Watson Research Center, NASA, etc.) where many achievements in nanotechnology were being made. I also worked with Nara Institute of Science and Technology (NAIST) in the creation of a new academic field called "bionano processes" that merges biotechnology and nanotechnology.

At Tohoku University, promoting collaborative activities with researchers from diverse fields has significantly expanded our research areas. For example, we have been actively conducting exchanges for about 15 years with National Chiao Tung University in Taiwan—the world's No. 1 semiconductor nation—based on the nanotechnology developed at Tohoku University. The key advantage of Taiwan is its mechanism for driving innovation through the free exchange of knowledge among industry, government, and academia. This has made the electronics industry in Taiwan the most dynamic in the world. At the core of this mechanism is National Chiao Tung University. For me, this environment made our activities in Taiwan inevitable, and we are promoting international industry-academia collaboration for disseminating our technology to the world via National Chiao Tung University. In fact, we established a Tohoku University – National Chiao Tung University joint laboratory in 2018 to provide our researchers, who have traditionally conducted their semiconductor research individually, an opportunity to come together and disseminate the technology of Tohoku University to the world.

My final objective through these efforts is to drive innovation through our technology and to "Make Japan a semiconductor powerhouse again!" This is my lifework.