

Hiroaki Yanagida: A man with a vision

Masaru Miyayama · Enrico Traversa

Published online: 30 March 2010
© Springer Science+Business Media, LLC 2010

Dr. Hiroaki Yanagida was one of the most prominent scholars worldwide in the field of ceramics and surely one of the pioneers in studying their electrical properties. He was also one of the founding members of the Editorial Board of the Journal of Electroceramics. He untimely passed away on November 20th, 2006, shortly after being awarded the prestigious W.D. Kingery Award of the American Ceramic Society. Sadly, a sudden illness kept him from the pleasure of attending the ceremony and personally receiving the award. This special issue aims to pay a tribute to his memory, collecting contributions from some of his close co-workers and pupils.

Yanagida's scientific contributions spanned over more than 400 papers in a nearly 50 year-long career, mainly in the field of electroceramics and design of materials with novel and intelligent functions. He already reported seminal papers during his stay as a research associate at the University of Southern California, Los Angeles, in the group of Professor F. A. Kröger. An example is the investigation of transport phenomena in stabilized zirconia, evidencing the role of the triple phase boundary among electrolyte, electrode, and vapor phase, which was a milestone in understanding the working mechanism of oxygen gas sensors and solid oxide fuel cells [1].

After returning to Japan and securing a Faculty position at the Faculty of Engineering of the University of Tokyo, where

he made a very rapid career progression, Yanagida started to work on the design of materials with novel functions, exploiting the synergy of non-linear phenomena of two different materials, with the approach he defined as “two dimensional design” [2]. Following this strategy, Yanagida and co-workers developed selective gas sensors for CO detection using p-n heterocontacts between CuO and ZnO [3]. This was also the field in which various collaborative works were conducted with many researchers including E. Traversa [4]. The understanding that the interactions between different materials can lead to self-recovery, tuning capability, and overall intelligent functions, had been pioneered by Yanagida, who proposed the concept of intelligent materials [5]. This concept initially raised some controversies and debates among fellow scientists, albeit now has a wide acceptance, showing the extraordinary vision of Hiroaki Yanagida, and his being in advance of his time.

Another very important contribution, derived from the innovative materials design of Yanagida, was the development of structural materials having self-diagnosing capability [6]. This was exploiting harmoniously mechanical and electrical properties of carbon-fiber-glass-fiber-reinforced plastic composites, which allowed the detection of mechanical damages by simply measuring the electrical resistance.

Yanagida's contributions were not only in science, but also in management, societal implications, and overall R&D philosophy. After retiring from the University of Tokyo, he became Director General at the Japan Fine Ceramic Center and then President of the Nagoya Institute of Technology. He was frequently interviewed by the media, as reported in Fig. 1, which shows the partial reproduction of an interview from the Asahi Shimbun, one of the major Japanese newspapers. He was convinced that research and its output should be simple and easy to understand, even for the common people, avoiding what he called “spaghetti syndrome”. Moreover, he was fully

M. Miyayama (✉)
Research Center for Advanced Science and Technology (RCAST),
The University of Tokyo,
4-6-1 Komaba,
Meguro-ku, Tokyo 153-8904, Japan
e-mail: miyayama@rcast.u-tokyo.ac.jp

E. Traversa
International Research Center for Materials Nanoarchitectonics
(MANA), National Institute for Materials Science (NIMS),
1-1 Namiki,
Tsukuba, Ibaraki 305-0044, Japan
e-mail: TRAVERSA.Enrico@nims.go.jp



Fig. 1 Partial reproduction of an interview given by Professor Hiroaki Yanagida to the Asahi Shinbun (one of the major Japanese newspapers) on January 30th, 2000

convinced that the main aim of research has to be the improvement of people's quality of life, towards sustainability. Also in this field, he had a vision and was a pioneer. Yanagida had a peculiar clarity of mind and ability to put his research in a frame and give motivations for his ideas. This was inspiring and still represents the legacy of Yanagida: many of his former students are now prominent Professors or Researchers, not only in Japan, but also in China, Korea and elsewhere. Truly a man of the world, and yet a real Japanese, he pioneered also the need for Japan to be more open to international interactions.

The papers collected in this special issue represent a small testimony of the legacy of Dr. Hiroaki Yanagida, and affirm that his memory is still alive in the persons who had the honor to share part of his life.

Panel 1

Dr. Hiroaki Yanagida—Main Achievements

June 1st, 1935–November 20th, 2006



Academic Degrees

1958 Bachelor, 1960 Master, 1963 Ph.D, all from Faculty of Engineering, The University of Tokyo

Professional and Administrative Careers

1963 Research associate, 1966 Associate professor, 1978 Full Professor, The University of Tokyo (UT)
 1989–1990 Director General, Research Center for Advanced Science and Technology, UT
 1991–1995 Director, Environmental Science Center, UT
 1996 Professor Emeritus, UT
 1996–2000 Director General, Research Institute, Japan Fine Ceramics Center
 2000–2004 President, Nagoya Institute of Technology
 2004–2006 Deputy Director, Research Center for Science Systems, Japan Society for the Promotion of Science
 2004–2006 President & CEO, Techno-search Inc.
 2006 Director General, Nagoya City Science Museum
 2006 Vice-president, The Engineering Academy of Japan

Major awards and presidentship in academic societies

The Ceramic Society of Japan:

1979 CerSJ Award for academic achievements in ceramic science and technology, 1991 Centennial Anniversary Award for Outstanding Academic Contribution, 1993 President

The Chemical Society of Japan:

1985 The CSJ Award for Creative Work, 1991–1993 Vice-president

The American Ceramic Society:

1985 Fellow, 1986 Orton Memorial lecturer, 1998 Distinguished Life Member, 2006 W.D. Kingery Award

Other awards and Memberships:

1990–1996 Academy of Ceramics, Charter Member
 1998 Purple ribbon medal award from the Emperor of Japan
 2005 Doctorat Honoris Causa, University of Limoges

References

1. H. Yanagida, R.J. Brook, F.A. Kröger, *J. Electrochem. Soc.* **117**, 594 (1970)
2. H. Yanagida, *Chem. & Chem. Ind.* **39**, 831 (1986)
3. Y. Nakamura, H. Yoshioka, M. Miyayama, H. Yanagida, T. Tsurutani, Y. Nakamura, *J. Electrochem. Soc.* **137**, 940 (1990)
4. E. Traversa, M. Miyayama, H. Yanagida, *Sens. Actuators, B* **17**, 257 (1994)
5. H. Yanagida, *Angew. Chem.* **100**, 1030 (1988)
6. N. Muto, H. Yanagida, T. Nakatsuji, M. Sugita, Y. Ohtsuka, *J. Am. Ceram. Soc.* **76**, 875 (1993)