



## **Chiba's Leader: Scientist, Teacher, and Man**

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### **Abstract:**

Essay for the festschrift edited by Prof. Norimichi Tsumura for the retirement of Professor Yoichi Miyake. The celebration event is held Saturday 12 September 2009 at Arcadia Ichigaya, Tokyo.

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## Chiba's Leader: Scientist, Teacher, and Man

I have known Dr. Miyake for a long time; in fact, we had a common past at the Swiss Federal Institute of Technology in Zürich, where Dr. Miyake was a post-doctoral fellow from 1978 to 1979 in the Institute for Photography led by the late Prof. Wolfgang F. Berg. At that time Dr. Miyake implemented the first digital color management system. I had finished my diploma the previous year, so we did not meet at that time, but having studied photography under Prof. Berg gives us a common memory to share.

Leadership in science is a difficult skill. Because radically new theories are often viewed with suspicion, many scientists are content to merely make small improvements to current theories. As a true leader, Prof. Miyake has always been more interested in new research directions than taking a well-trodden path. He selects an important practical problem and then searches deeply for a disruptive approach.

Early in his career, Dr. Miyake quickly progressed from color photography to digital color imaging science, contributing to all aspects of color reproduction. In doing so, he has always been passionate for practical applications that improve people's lives and work. His research has covered medical, forensic, and multi-spectral imaging, including also the ancillary optical problems. In addition to the medical and forensic applications, his research has encompassed also cosmetics, the 3-dimensional goniospectral reproduction of museum artifacts, and color printing.

The crown jewel is Dr. Miyake's research in endoscopy. In the early days, endoscopes were monochrome, because color was unpredictable, thereby obfuscating diagnosis. Dr. Miyake first invented a spectrophotometric endoscope which he then used to collect spectral data on the enterogastric mucous membranes, and subsequently performed a principal component analysis on the data. He discovered that the reflectance spectra can be estimated from just three principal components, leading to an inexpensive trichromatic instrument. Along the way, he was required to solve difficult problems to color-calibrate the system during repeated clinical use, as well as design color appearance models to render the images under different illuminants.

Dr. Miyake's continued research in this field culminated in the revolutionary Fuji Intelligent Chromo Endoscopy (FICE) instrument and staining technique, an electronic endoscope system that can record arbitrary spectral images of the various mucous membranes. As documented in the vast scientific literature on clinical research with FICE, compared with ordinary magnifying colonoscopy and magnifying staining endoscopy, FICE can show the mucosal microstructure and blood capillary structure with high statistical confidence and high sensitivity. In addition, FICE is easy to guide and allows the safe collection of biopsies.

In April 2003, Dr. Miyake cofounded the Research Center for Frontier Medical Engineering (CFME) in Chiba, and he is currently the director. He is also responsible for image analysis and evaluation, as well as color image processing. Dr. Miyake recognized that in the 21<sup>st</sup> century, medical engineering is expected to become recognized as one of the most important fields of science and technology. He was able to establish CFME due to the strong cooperation with the School of Medicine, the University Hospital, the Faculty of Engineering and industries.

When he returned from Switzerland, Prof. Miyake started the research and teaching of electronic imaging in Japan. In addition to the Herculean effort required to create and run the imaging research institute at Chiba University, he also established and ran the teaching department. Many imaging scientists in Japan are former Miyake students. During the period 1990–1993, when I was the Color Advisor at Canon, the imaging scientists hired in the Shimomaruko Technical Center at corporate headquarters came from Prof. Miyake's department. This was also the case for all our competitors in Japan. These students were very well trained. More

importantly, however Prof. Miyake welcomed a large number of visiting scientists and engineers from all Japanese companies in the imaging business.

Through these teaching activities, Prof. Miyake has substantially contributed to the creation of a generation of imaging professors, scientists, and engineers who collectively have a deep impact on the success and worldwide leadership of the Japanese industry in digital color imaging. Through his prolific participation in international conferences, Prof. Miyake is generously sharing his research with the rest of the world.

Yoichi-san is a very special person. My wife Yoko liked his soothing aura, and especially his predilection for exquisite food. We had many memorable dinners around the world when we met at conferences: from Chiba to Yokohama, Kyoto, Zürich-Regensdorf, Montréal, Hilton Head, Portland, Scottsdale, ... and backyard barbecues at our home in Palo Alto. We had dinner more than once at Chez Emile in San Jose, and even Chef Emile Mooser liked to join us at our table for a drop of wine and to enjoy that state of being for which there is just a Japanese expression: きもち.

With his relaxed demeanor, Yoichi-san is very approachable, and invites both scientific and philosophical discussions. For example, this allows us to deepen our understanding of his presentations, because in the ensuing breaks we can ask detailed questions and receive frank explanations about why something is better done this way rather than that way.

With all this, I am very happy Dr. Miyake is not really retiring, but just focusing all his energies on research in his Center for Frontier Medical Engineering at Chiba University. I am confident this will result in important inventions for humanity, and I look forward to learn about the new science and technologies when we meet at the next conference.



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San Jose 1999, with Chef Emile Mooser and John McCann