

日本での留学経験とその後

Axel PILGRIM

(著者紹介)

Dr. Axel Pilgrim氏は京都大学とDortmund大学の交換留学で初めて来日され、母国の大学を卒業後に(京大院)化学工学専攻に入学し博士号を取得されました。その後は(株)クラレ/ドイツ現地法人に就職後、4年後に自動車業界にゴム製品や樹脂製品を販売するContinental社に転身され、2015年にはContinental社の日本法人の一つであるContiTech Japanの代表取締役役に就任されています。氏の活躍を支えるルーツとして、日本で学んだ経験主義と、西洋式の演繹主義の二本柱が大きいと述べられています。また留学時に始めた剣道は今でも続けていらっしゃるそうです。

(第一分科会/坂本)

1. Motive to study in Japan

In autumn 1995 I came the first time to Japan as part of an exchange program between the University of Dortmund and Kyoto University organized by Prof. Masataka Tanigaki at that time. During the exchange program, I worked as an intern at Kuraray Corp. R&D in Kurashiki, working on the redesign of a multi-effect distillation system from October to December. Here I experienced a strong cooperation and support among all colleagues. I also came closer to the Japanese culture as I stayed in the company dormitory, and had Japanese-style breakfast and dinner, taking bath together in the dormitory *sentō* etc. same way as my Japanese colleagues. At that time, due to the absence of any English signs, I learned my first pieces of Japanese characters, *kanji*, too.

Coming back to Germany, my decision was to return to Japan after finishing my study at Dortmund University. As my field of research, simulation of preparative chromatography, was also a research topic at Kyoto University Chemical Engineering Department, I applied to Professor Kenji Hashimoto Chair of Chemical Reaction Engineering and was kindly accepted. With the support of scholarship of the Japanese Minister of Culture and later on of the German Government University Special Program III scholarship I moved to Japan and started my academic adventure in Kyoto.

2017年11月22日受理



Picture 1: Intern at Kuraray in Japan, (1995)

2. Campus life and research project

In Japan, I started my research on enzymatic reactions under chromatographic separation condition under Professor Kenji Hashimoto and later on under Prof. Koichi Miura while being under supervision of Dr. Motoaki Kawase, the latter now actually heading the very same chair at Kyoto University.

I investigated the reaction kinetics of a complex enzymatic reaction for the production of lacto-fructose, a probiotic sugar used in Japanese food industry and applied this reaction system to a simulated moving-bed chromatographic reactor where chromatographic separation of the products and reaction occurred simultaneously. Based on simulation, I could not only optimize the yield of the process, but show the correctness of the applied model by comparison between simulation and measurements in various publications and presentations.¹⁻⁸⁾

Besides my research project, I also enjoyed campus life as my lab was located on the main campus of Kyoto University, Yoshida Campus, that time. Being an enthusiast for Japanese traditional *budo*, I joined the kendo club of Kyoto Univ. sport union, and despite of my status as a graduate student I started there as a first-year student, and over the following years as an official club member I had not only the chance of dramatically improve my kendo skills, but also to make a deep dive into the Japanese culture: There are only few things which are as



Picture 2: Kendo in Germany, (2008)

traditional and Japanese such as a *tai'ikukaikei* university kendo club in Japan, and even today, I am still benefiting from the skills and virtues I learned during this time as I elaborated on in a published article for an international kendo magazine some years ago.⁹⁾

Both experiences, inside the lab as well campus life, had a big impact on my further professional career.

3. Merit of studying in Japan

First of all, as my experience of studying in Japan is limited to Kyoto University with its very culture of freedom, it might be an individual case. In my lab, I experienced a lot of freedom how to organize my routine and the direction of how to approach my research topic.

In comparison to Germany, where non-academic technical staff supports usually the research, my supervisor and I basically were on our own when operating complex analytical equipment or assembling reactor in the lab. While this might be considered additional non-academic workload, it gave me the chance to not only focus on my core research, but also having the ownership on incremental improvement, *kaizen*, on the reactor equipment, preparation of samples, and analytical equipment, thus allowing me to expand my horizon.

In addition, my research background when starting my research at Kyoto University was mainly process modeling and optimization. In Japan, on the other side, process optimization was more experimental based. Here, I found one of the major gap between Japanese scientific thinking, which is more based on fact and figures and observation (*genbutsu, genjitsu, genba*) and

Western approach which is more based on hypotheses. Tatsuo Tamura elaborated on this gap in his famous article "Hamburger Science and Sushi Science".¹⁰⁾ After many years of experimental work I became able to take both perspectives without judgment about right or wrong approach, a quality which would help me a lot in my later professional career.

4. My career after graduation from Kyoto University

After receiving my Ph.D. in engineering from Kyoto University, I started my career at the R&D department of Kuraray Ltd. 2002 at Frankfurt-Hoechst site, Germany, where I was responsible for the polyvinyl alcohol (PVA) General Application laboratory. One of my tasks here including technology transfer between Kuraray R&D headquarter in Kurashiki, Japan and the Frankfurt site. At Kuraray, I proceeded my career as assistant plant manager for the polyvinyl butyral (PVB) plant, among other things predictive quality assurance based on PCA/PLS models (what is our days now called "industry 4.0") where by coincidence I had the chance to work together with same colleagues I already know from my internship in 1995.



Picture 3: Working at Kuraray in Kurashiki R&D, (2003)

In 2006 I made a major step then by changing from the chemical industry to automotive industry by taking a position at Continental AG, an international mega-supplier to the automotive industry with around 230.000 employees supplying tires, (automated) break systems, cockpit modules, powertrain parts, sensors, as well as automated driving solution. Here I was responsible for the project management of development projects with Japanese car manufacturers and their first tier suppliers as well as customer acquisition. In this roll, relocated to my "second home", Japan, again in 2009, living in the international City of Yokohama.



Picture 4: Presentation Japanese market characteristics, Continental AG, (2014)

In 2015, I was given the chance then to take over responsibility for one of the legal entities of Continental AG in Japan as representative director, namely ContiTech Japan Ltd., which represents the division of Continental dealing with rubber- and plastic-based solutions such as power transmission systems, car interior surface materials, fluid systems or vibration control systems for both automotive and industrial sector.

Again, I could also profit from my bottom, or *ura*, experience from my previous study in Japan again when steering the business of an international company with Japanese customers. Because I have an educational background rooted both in Germany and Japan, it is also easier for Japanese customer as well as company in-house colleagues to accept my judgments and opinions. And being member of both the Kyoto University Chemical Engineering Department alumni organization as well as the Kyoto University Kendo Club alumni organization I am in the fortunate situation to continue my social contacts in Japan as well as to use my network in business environment.

.....
Publications

1. Motoaki Kawase, Axel Pilgrim, Takushi Araki, and Kenji Hashimoto, "Lactosucrose Production using a Simulated Moving-Bed Reactor", Chemical Engineering Science 56 (2), 453-458 (2001).
2. Axel Pilgrim, Motoaki Kawase, Masayasu Ohashi, Koki Fujita, Kazufumi Murakami, and Kenji Hashimoto, "Reaction Kinetics and Modeling of the Enzyme Catalyzed Production of Lactosucrose using β -Fructofuranosidase from *Arthrobacter* sp. K-1", Bioscience, Biotechnology, Biochemistry 65 (4), 758-765 (2001).

3. Motoaki Kawase, Axel Pilgrim, and Kouichi Miura, "Application of the Simulated Moving-Bed Reactor to the Enzyme-Catalyzed Production of Lactosucrose", Proceedings of the 9th APCCHE Congress and CHEMECA 2002 (Christchurch, Sep-Oct, 2002), Paper # 125 (17 pp.) (2002).
4. Axel Pilgrim, Motoaki Kawase, Fumihiko Matsuda, Kouichi Miura, "Modeling of the Simulated Moving-Bed Reactor for the Enzyme-Catalyzed Production of Lactosucrose", Chemical Engineering Science 61, 353-362 (2006).

.....
Presentations

5. Axel Pilgrim (presenting), Motoaki Kawase, Takushi Araki, Kenji Hashimoto, "Enzyme catalyzed production of lactosucrose", 64th annual meeting of the Society of Chemical Engineers, March 25-27, 1999, Nagoya, Japan
6. Axel Pilgrim (presenting), Motoaki Kawase, Takushi Araki, Kenji Hashimoto, "Lactosucrose production in the homogeneous phase using a simulated moving bed reactor", 32nd autumn meeting of the Society of Chemical Engineers, September 26-28, 1999, Kanazawa, Japan
7. Motoaki Kawase, Axel Pilgrim (presenting), Takushi Araki, Kenji Hashimoto, "Lactosucrose production using a simulated moving-bed reactor", 16th International Symposium on Chemical Reaction Engineering, September 10-13, 2000, Krakow, Poland
8. Axel Pilgrim (presenting), Motoaki Kawase, Kouichi Miura, "Development of a novel enzyme-catalyzed process – the lactosucrose production using a simulated moving-bed reactor", 6th meeting of the Society of Chemical Engineers – West-Japan, Juli 26-27, 2001, Fukui, Japan
9. Axel Pilgrim, "The Dōjō and the Boardroom: Executing Strikes and Decisions", Kendo-World – A Bunkasha Publication, 5 (3), 2011

.....
Reference

1. Tatsuo Motokawa, "Hamburger Science and Sushi Science" Perspectives in Biology and Medicine, 32: 489-504 (1989)

(Contact information)

Dr. Axel PILGRIM

Phone: +81-45-444-4358 / FAX: +81-45-444-3837

E-mail: axel.pilgrim@continental-corporation.com

<http://www.contitech.jp>