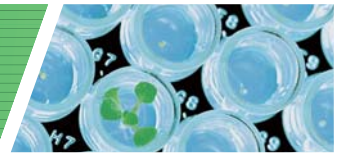
Dr. Sastia Prama Putri and Professor Eiichiro Fukusaki from Osaka University

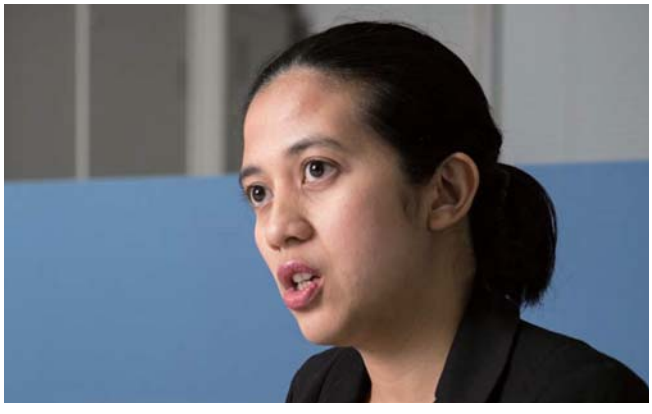


We interviewed Dr. Sastia Prama Putri, a specially-appointed Assistant Professor in the Department of Biotechnology, Graduate School of Engineering, Osaka University, Japan, and Professor Eiichiro Fukusaki, a leading expert in food metabolomics, about the collaborative research between Osaka University and Indonesian research institute since 2011. One of the significant results was finding out the discriminant marker of the Indonesian Kopi Luwak, which is known as the world's most expensive coffee, but there is no standard method for determining its authenticity. It recently gained worldwide attention and was featured in many mass media including USA Today, BBC UK and so on.

Thank you very much for spending some time for this interview. First, I would like to know about Dr. Putri and your project with the Indonesian government. Could you introduce yourself and tell us about the project including its background, when it has started, what the goal is, your mission and so on?

Putri:

I am originally from Indonesia and I started my career in metabolomics after joining Prof. Fukusaki's lab in 2011. Together with a Ph.D. student from Indonesia, Mr. Udi Jumhawan, we did some brainstorming on the possible research problems that can be solved using the metabolomics approach. We were particularly interested in applying the metabolomics technology to something relevant and unique to Indonesia. Finally, we chose Kopi Luwak because of its high economic value. It is a valuable export commodity for Indonesia, and despite its popularity, very few research groups are working on Kopi Luwak. We realized that one of the most important aspects to pursue in this research project is finding a solid research partner. Therefore, we contacted the Indonesian Coffee and Cocoa Research Institute (ICCRI), one of the leading research institutes and producers of specialty coffee in Indonesia. We identified the most important problem of the Kopi Luwak industry is the lack of a standard method for authentication. This resulted in various attempts of adulteration in the market that damaged the reputation of the industry as a whole. Meanwhile, metabolomics studies have been proven useful for assessing food quality, food safety, food authentication, and determining the origin and varietal differences of food samples. We introduced the concept of metabolic profiling to our colleagues in ICCRI and showed how it can be used to seek for biomarkers that are important for Kopi Luwak authentication. They were very positive about the collaboration and we started the collaborative project in mid-2011. The main purpose of the project was to find biomarkers for Kopi Luwak authentication and establish a low cost and reliable method for routine analysis for Kopi Luwak authentication in Indonesia.



What discoveries or achievements have you made so far?

Putri:

We are very fortunate that through a solid collaboration between Osaka University and researchers in Indonesia, we could identify the discriminant markers for authentication of Kopi Luwak. This research provides a basis for a standardized method for Kopi Luwak authentication. We were also able to discriminate pure Kopi Luwak from those which are blended with other coffee thus, addressing the issue on Kopi Luwak adulteration.

What do you evaluate Shimadzu's instruments? What are our advantages over other vendors?

Fukusaki:

I feel that Shimadzu mass spectrometers have significantly improved in the recent years. In particular, the scan speed of Shimadzu mass spectrometer is superior compared to other vendors. I think that Shimadzu Nexera is the best LC/MS and the price is also quite reasonable.

Putri:

The sales person and after sales support staff are very kind and attentive so I have been very happy with the technical support staff of Shimadzu.

Do you have any requests to us?

Fukusaki:

My request to Shimadzu is the improvement of software for data analysis and the application data, which is not so excellent at this moment. We recently established collaborative laboratory, named Osaka University and Shimadzu Analytical Innovation Laboratory and we hope that this laboratory will contribute to expand and increase the application area. Just a personal opinion, Shimadzu should also put more investment in the instrument design to make it more attractive.

Why did you choose Professor Fukusaki's laboratory as your destination of studying abroad?

Putri:

I was born and raised in Indonesia and moved to Japan in 2004 to pursue my master and PhD studies in the International Center for Biotechnology, Osaka University under Prof. Takuya Nihira's supervision. My PhD work was about structure elucidation of novel bioactive compounds from various natural products and I am also a trained microbiologist. I became interested in the rapidly developing field of metabolomics and joined Prof. Fukusaki's laboratory in January 2011 as a postdoctoral researcher. At that time, there were various metabolomics projects in Fukusaki lab and I was really interested to learn more about the application of metabolomics in various disciplines, including food science, biofuel research and medical applications. Prof.Fukusaki is one of the leading researchers in food metabolomics and he has extensive collaborations with many Japanese companies as well as domestic and international research institutes and universities. Most importantly, his laboratory is very open to international students and it gave me a chance to become a global researcher. In fact, his laboratory is an excellent place for early career researchers such as myself to improve their careers.

Now I would like to ask Professor Fukusaki. I have heard that you have accepted a lot of students from abroad and promote their exchange. What are the benefits?

Fukusaki:

Osaka University aims to establish a global campus, where students can learn in an international surroundings and interact with students coming from many different countries and cultural background. I would like to offer students new opportunities for developing their professional skills in multiple disciplines and communication skills to take active parts in the international scenes. I also believe that the international atmosphere in our laboratory will lead to the expansion of our collaboration network as well as strengthening our leading position in the field of metabolomics.

Do you have anything to add about both the research project and the instruments?

Fukusaki:

One of the most important outcomes of this Kopi Luwak research project is that the method that we develop can be applied as a standard routine procedure for Kopi Luwak authentication. For this purpose, we recently published another paper entitled "Application of GC/FID-based metabolite fingerprinting for authentication of Asian palm civet coffee (Kopi Luwak)". Since GC/FID system is cost effective and is readily available in our research collaborator's institute, we hope that this system can be a practical method for authentication in Kopi Luwak industry.

Could you share your vision of your research and what instrumentation or functions you need to achieve your research goal?

Fukusaki:

Our laboratory's main core is mass spectrometry-based metabolomics, with very wide applications in various fields. We currently have 16 mass spectrometers in our laboratory, including GC/MS, LC/MS, CE/MS, and SFC/MS. In the near future, our laboratory will expand the application area of metabolomics and enrich our toolbox by incorporating NMR technology and imaging mass spectrometry. We are also continuously making efforts to maintain a strong pipeline of collaboration with the private sector as well as domestic and international academic institutions.

It was precious and significant to know what you think of us. Thank you very much.

Here are their recent publications:

Jumhawan U, Putri SP, Yusianto, Bamba T, Fukusaki E. Application of gas chromatography/flame ionization detector-based metabolite fingerprinting for authentication of Asian palm civet coffee (Kopi Luwak). <http://www.ncbi.nlm.nih.gov/pubmed/25912451> J Biosci Bioeng. 2015 Apr 22. pii: S1389-1723(15)00104-8. doi: 10.1016/j.jbiosc.2015.03.005. [Epub ahead of print]

Mimura N, Isogai A, Iwashita K, Bamba T, Fukusaki E. Gas chromatography/mass spectrometry based component profiling and quality prediction for Japanese sake. <http://www.ncbi.nlm.nih.gov/pubmed/25060729> J Biosci Bioeng. 2014 Oct;118(4):406-14. doi: 10.1016/j.jbiosc.2014.04.006. Epub 2014 Jul 22. Note: this paper won best paper of the year from the Journal of Bioscience and Bioengineering

Shiga K, Yamamoto S, Nakajima A, Kodama Y, Imamura M, Sato T, Uchida R, Obata A, Bamba T,Fukusaki E. Metabolic Profiling Approach to Explore the Compounds Related to the Umami of Soy Sauce. <http://www.ncbi.nlm.nih.gov/pubmed/24954189> Agric Food Chem. 2014 Jul 23;62(29):7317-22. doi: 10.1021/jf501173r. Epub 2014 Jul 11.

Yamamoto S, Shiga K, Kodama Y, Imamura M, Uchida R, Obata A, Bamba T, Fukusaki E. Analysis of the correlation between dipeptides and taste differences among soy sauces by using metabolomics-based component profiling. <http://www.ncbi.nlm.nih.gov/pubmed/24491915> J Biosci Bioeng. 2014 Jul;118(1):56-63. doi: 10.1016/j.jbiosc.2013.12.019. Epub 2014 Feb 1.

Putri SP., Bamba, T., Fukusaki, E. Application of metabolomics for discrimination and sensory predictive modeling of food products. In “Metabolomics - food and nutrition” (e-book). Future Science, London, UK. Dec 2013.

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