Associate Professor Shuhei Furukawa

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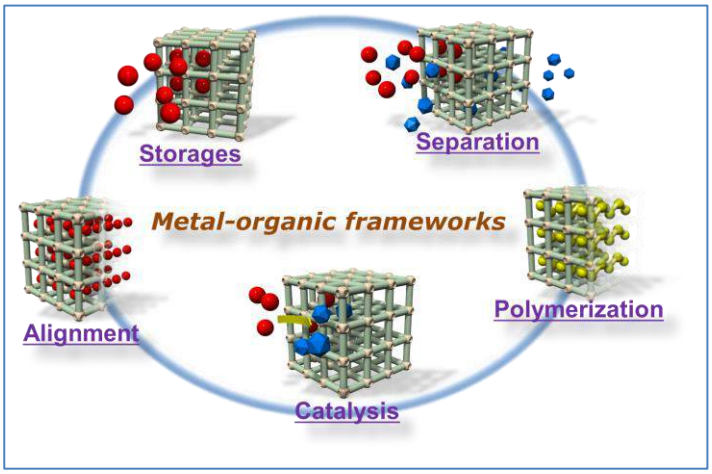
Collaboration details
Collaboration name: Metal Organics Framework materials for CO2 and Methane capture.
Type: Sharing materials and research
Partners: University of Adelaide and CSIRO
Dates: 2012-2013
Summary: Synthesis and characterization of porous materials.

Potential applications: Capture and store green house gases which could help reduce global warming. Lower cost and increase the efficiency of industrial processes. There are likely to be other new applications that are yet to be discovered!

Confidence in the high quality of Australian research and a mutual taste for a beer after work has led Kyoto University's Shuhei Furukawa and his Australian collaborators to publish multiple peer-reviewed articles on green house gas capture and storage technology.

"I am currently working to develop new porous materials, metal-organic frameworks, to absorb green house gases. This material is similar in function to a sponge but rather than absorbing soapy water my porous materials absorb gases like CO2 and methane.

This technology is a major focus for thousands of researchers around the globe including Australia and we all have the same target, to capture CO2 and methane and to store it efficiently.



In 2012 I had a chance to be part of the Australia Japan Emerging Research Leaders Exchange Program. This let me go to Australia for two weeks. In Australia I gave seven research presentations in seven different institutions over two weeks on the work I am doing on porous materials. Everyday I had to move to a new city. It was really good to meet so many people so efficiently. It was during this time that I met the guys with whom I am now collaborating. As soon as we met we started talking frankly about science and also normal things, like daily life, over drinks and we became friends.

In Australia there is a major project which has a mission to capture carbon dioxide and then convert it to something useful. This type of application is an unconventional use of the porous material. And that is what I am also doing in Japan, working on unconventional and niche applications for this porous material. My research objective is to use it for cellular biological applications to regulate biologically active gas molecules like nitric oxide and carbon monoxide, which are also known to be

toxic gases. In order to do that I need to control the size and position of the porous crystals in a precise way on the cell culture substrate.

One of the Australians I met and became friends with is an engineer. He had a very good idea as to how we could position the crystals wherever we wanted by using a micro engineering technique. And that is how we started an informal collaboration.

Normally when you meet a scientist for the first time you don't show them unpublished data because it might be skewed or something. But once you become friends you would rather talk about what you are doing now, not published data that may be from a long time ago. It is really important for researchers to trust each other so that they feel confident to share this information.

Because we got along so well as friends we started to talk quite quickly about our projects, like, I am working on this project now, and I want to do this and that and I need this kind of technique to do something. One of my new friends said, OK, we can do that! So then I was also able to reciprocate. He showed me what he was doing and that he needed the type of material I am working on because he can synthesis it. Because of our friendship and trust I was able to send a sample to him.

You would normally think that it would be easy to collaborate with a specialist, for example, you might have an idea and say 'let's collaborate with this guy because this guy has a special technique'. But most of the time it doesn't work out because you need to trust each other as you are working together on unpublished data. Also there are other issues to consider, for instance who is going to take leadership and authorship? But once you become friends informally first, no one cares about that. We then say, 'let's make these things together', and that's what works really well.

My work with Australia has not cost a lot of money and has been very productive in a number of ways. For example based on our collaborations we have published three papers in a well regarded, peer-reviewed journal in addition to the original paper. We've also produced a book chapter. My Australian colleague has also presented at conferences.

I trust the way my Australian friends conduct their scientific methods. I know that they work in a precise way like the Japanese. They always doubt the data which is important as you need to characterize and identify the science from the different view points. That is most important in science and in Japan we really do that. I can believe their results and I can trust them.

Another benefit of collaborating with Australia is that there is no time lag. Collaboration between Europe and America involves a time lag. We have to call either very early or very late. But with Australia I could call now. We often use internet calling or texting. It is very nice not to have such a big time difference and easy to travel too with no jet lag.

When funding becomes available I would encourage the students I supervise to conduct research in Australia. Because I know these guys and have seen them work, I am confident in the quality of the work they produce and my students would benefit from that experience. Also I can see that they are teaching students in a very good way and that their students are also very good.

Overall I'd say that the scientific interest is most important but it also needs to become a human relationship."