# My Story with CAS: From Africa, Europe, to China

Dr. Patrick Mountapmbeme Kouotou, Cameroonian Researcher working at the Institute of Engineering Thermophysics (IET), CAS shares his experience as a recipient of the CAS Visiting Professorship for Senior International Sciences.

*"I feel really honored to have gotten this opportunity, and I am highly motivated to give my best in this adventure. True scientific research follows its passion and never gives up in spite of difficulties it may encounter."*

## My Research at IET

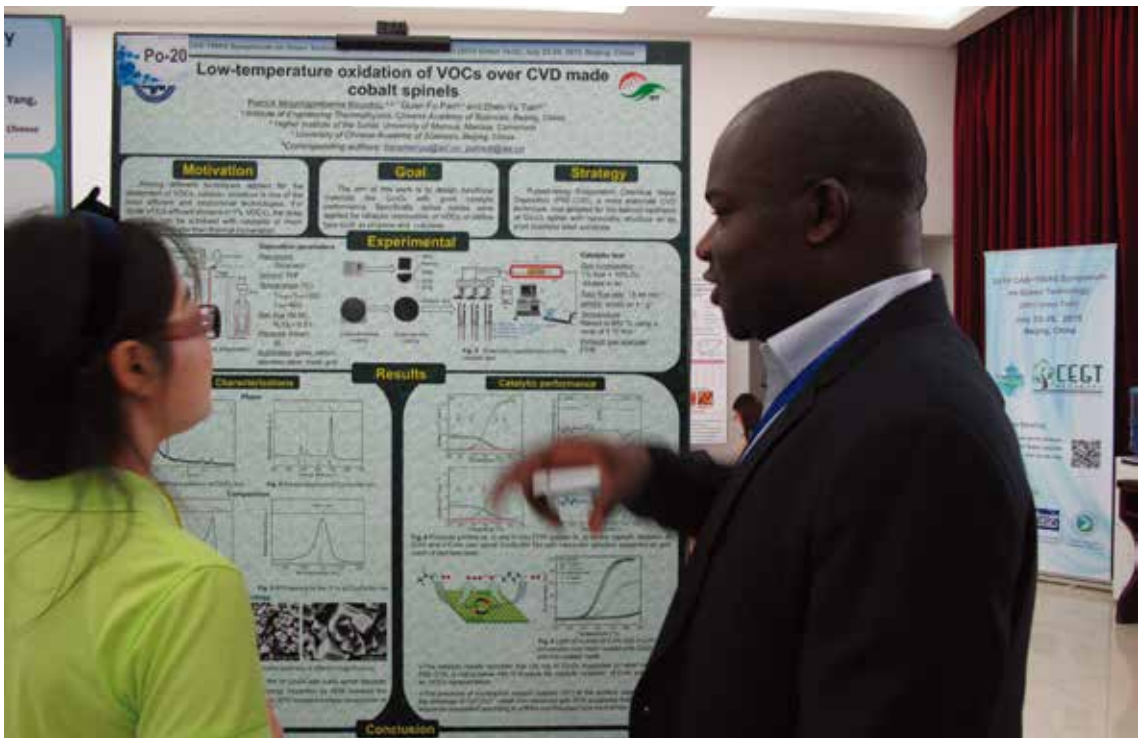
Born in Cameroon, I moved from Germany to China after my PhD, to pursue research work at the Chinese Academy of Science (CAS) in Beijing. Within the framework of my fellowship, I am currently based at the Institute of Engineering Thermophysics (IET), one of the top research institutes in China. In this article, I would like to share my experience as a recipient of the prestigious Chinese Academy of Science Visiting Professorship for Senior International Scientists (Grant No. 2015PT016).

I have been awarded with a two-year CAS Fellowship (known as the CAS Visiting Professorship for senior international scientists). The host during the outgoing phase is the Laboratory of Circulating and Fluidized Bed (LCFB) at the IET, in the working group of Prof. TIAN Zhenyu, with proposal title: "Synthesis, characterization and application of functional transition metal oxides for the environmental emission control". In fact, our interest focuses on the synthesis of functional transition metal oxides with Chemical Vapor Deposition (CVD) approach. CVD technique is of two-fold interest for our group: on the one hand, the process itself is a subject of research and on the other hand, CVD techniques are used as tools to produce thin films. We have developed *in situ* methods to analyze and understand the reactions making CVD successful. Also, the established methods to deposit oxides, for example, are used to refine the functionalities of thin films. Particularly the as-deposited thin films are tested as catalyst towards total oxidation of some industrial exhaust stream and volatile organic compounds.

## How I Got Here

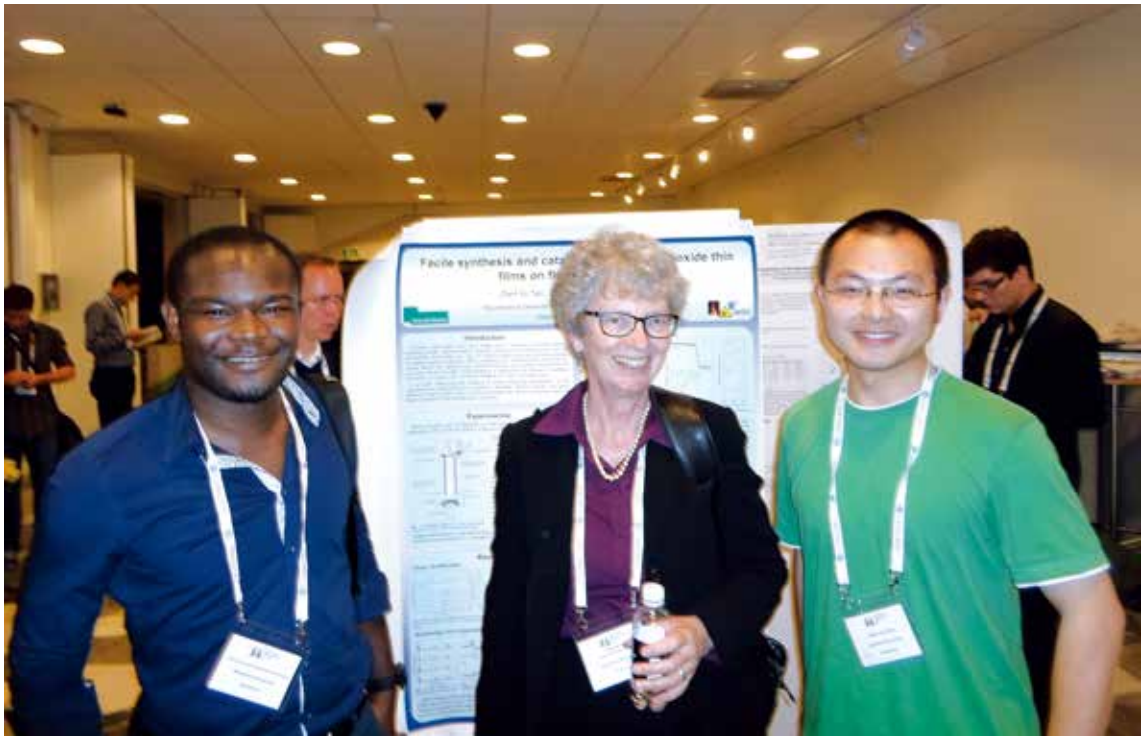
My story with IET began in Germany, as what might surprise you. In 2011 I won the Deutsche Akademische Austauchsdients (DAAD) and wen to Germany to do my PhD in Physical Chemistry at Prof. Dr. Katharina Köshe-Hoinghaus' working group at Physical Chemistry 1, Faculty of Chemistry, Bielefeld University. I was finishing up my degree thesis when Dr. TIAN, then a Humboldt fellow in our working

Dr. Patrick Mountapmbeme Kouotou explains to a student his research in front of his poster at a meeting on green technologies held in Beijing, summer 2015.



group and now a full Professor at IET, began talking to me about continuing our cooperation in China, at a point when he was preparing to get back his home country. In fact during our stay in Bielefeld, Prof. Dr. TIAN was the CVD group leader and my direct collaborator in the lab. When I joined the group in 2011, I had limited knowledge in catalytic combustion. After three years' study, I learned a lot from him. Together we developed aptitude at thinking and capturing the frontiers of the discipline while being sensitive to the new research field. While most of the researchers focus on the catalytic combustion investigations with noble metals, we aimed to study the heterogeneous combustion with the transition metal oxides. During my PhD period, I systematically studied the preparation and catalytic applications of Fe/Co-based oxides catalyst. Besides finding the most suitable precursors and solutions, better deposition rates, thermal stability and conductivity as well as catalytic performance towards the deep oxidation of CO and VOCs were obtained. Moreover, to better understand the catalytic processes, I proposed a new catalytic mechanism based on the experimental observations. In the process, he found that I was a smart, diligent, thoughtful student. As first author, my work has been published in the well-known journals, including *Journal of Materials Chemistry A*, *Catalysis Science & Technology*, *RSC Advances, Proceedings of the Combustion Institute* and *Surface & Coatings Technology*. These results have greatly extended the understanding of Fe- and Co-based oxides as catalysts. With less than three years, I got my PhD degree with a final comment "Very good". Besides Fe/Co-based oxides, I was also involved in other research topics, including the catalytic applications of Co-Cu oxides, Co-Mn oxides and natural clay. The related results have been published in *Proceedings of the Combustion Institute*, *Applied Energy*, *Surface & Coatings Technology* and *Journal of Physical Chemistry C*. In total, I finished my PhD study with a dozen of publications in well-known scientific journals. Today, I am sure that the good results and the excellent collaboration with him were very determinant for Prof. Dr. TIAN to choose me as one of the right persons to help him establish his working group at IET.

Drs. Patrick Mountapmbeme Kouotou (first left) and TIAN Zhenyu (first right) with Prof. Dr. Katharina Köshe-Hoinghaus (middle) at the European Combustion Meeting in Sweden, 2013.



A few months after my PhD defense, I went back to Cameroon, where I held a position as a Junior Lecturer at the Higher Institute of the Sahel, University of Maroua before my PhD study, and got promoted to the grade of Senior Lecture. Before going back home, however, I decided to apply for the Chinese Academy of Sciences fellowship. For me, this was a great opportunity. In the context of my home country, which lacks well-equipped laboratories, it is important for me to have a postdoc fellowship, especially an international one for two reasons: first it could enable me to establish my international career; and second, it would help me progress professionally and become a professor in my home country. Therefore, considering the good collaboration and experience that I had with him during my PhD stay in Germany, I started discussing with Prof. Dr. TIAN about the research proposal for application. We arrived at a good idea to capitalize the research work on transition metal oxides synthesis with CVD and their application for the environmental emission control. I succeeded with the application, and now we put together our expertise in research on synthesis of thin film materials and their applications in clean materials for low temperature combustion.

Dr. Patrick Mountapmbeme Kouotou and Prof. Dr. TIAN Zhenyu (first left) reunite with Prof. Dr. Katharina Köshe-Hoinghaus (middle) at North China Power Electric University during the meeting of Asian Section of the Combustion Institute in September 2015. Prof. Dr. Katharina Köhse served as President of the Combustion Institute during that period.

## My Science Career in Beijing

Today scientists all over the world might agree that China's academic environment is moving in a positive direction. Researchers in China are publishing more papers in elite journals year over year, and in a country where most of the top leaders are scientists and engineers, the focus on these important fields is more possible to continue. In that context, the CAS fellowship enables you to perform experiments in well-equipped labs and somehow to build an international scientific career. My stay at the IET offers me possibility to pursue research in my field of research and establish collaboration between IET and my home University. As far as the research is concerned, I have published already four scientific articles in the well-established peer review journals (three of them as first and corresponding author, and one as co-first author). Recently, we published a book chapter (as first and Co-corresponding author) in a book about materials science entitled: "*Magnetic Spinels-Synthesis, Properties and Applications*" (Book Intech, edited by Mohindar Singh Seehra, ISBN 978-953-51-2974-5). All these achievements will enable me to progress professionally in my home University, and build also my scientific international career as mentioned above. In terms of collaboration, I am discussing with IET the possibility to tie collaboration with my home University. The objective is to establish a platform that could give opportunity to PhD/Master's students as well as colleagues in Cameroon to travel to China and perform their research study in good working conditions.

In chemistry or life sciences in general, there are many techniques and skills you can use in your research. I have used many techniques during my PhD journey in Germany before, and I am now teaching these techniques and experiments here, training PhD and Master's students in China. On the other hand, there are many other experiments, techniques and protocols in materials synthesis and catalytic combustion missing in my expertise, and I get to learn them here in LCFB at IET. When I return to Cameroon, I will disseminate what I have learned here, and again learn many new techniques that will be overall useful in the project.

## Language Barrier

When I decided to move to China, a big worry was language. In order to avoid this problem, Prof. TIAN decided that English language should be the communication language in our research group. It was not an easy task, however. In fact, it's so easy to feel frustrated by miscommunication. People could get personally offended even when they know the problem is just language. English is the common language of science but the native tongue of only 7% of the world's population. Non-native speakers often feel that working in a new language flattens their personality and stifles their sense of humor. They can't make the small talks needed in building a relationship. Visiting scientists like me, whose main experience with English have been merely research articles and other written documents, would have to struggle with conversations. Working with collaborators from different backgrounds, I am always aware of possible cultural gaffe due to miscommunication, or the potential embarrassment of saying something unintentionally offensive.

As a visiting scientist, I am always trying to be a good, welcome guest contributing to the group, but not necessarily as an expert. To smooth over the inevitable miscommunication, I always acknowledge and appreciate the extra efforts everyone is making, and go in with the right attitude. For positive collaborations across languages and cultures, I endorse a principle in all situations: assume good intentions. With this attitude, which I have adopted since my arrival at the IET, I have made good friends with whom I am really close and happy. At this stage of my stay at the IET, I would say that I am enjoying somehow my stay here as a researcher, despite the difficulties I come across from time to time, which are not so important than my objective.

*If asked what advice I would give to researchers who are considering applying for a CAS-PIFI Fellowship*, my main advice would be to follow your passion, and find a lab that shares this passion. To my opinion, it is fundamental to have a team and a boss who doesn't just care about the impact factor of their papers, but who feel true passion for the scientific research. This is, from my point of view, real meaning of academic career – to follow your passion and never give up.