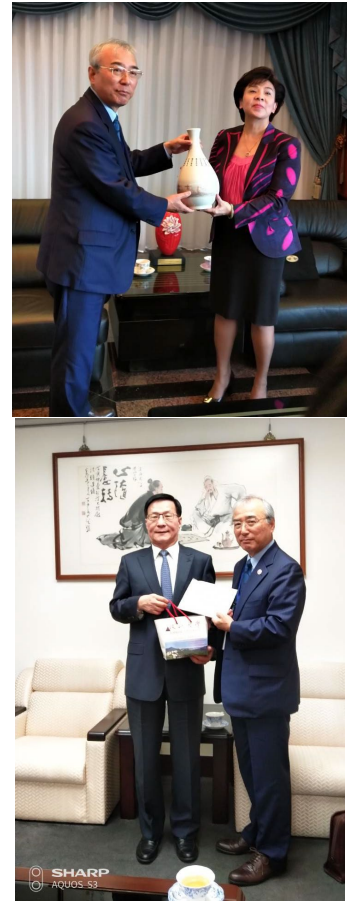


LECTURE 2



Dr. Masakazu Anpo

- **Full Professor, Osaka Prefecture University, 1990-2015**
- **Vice-President and Executive Director, Osaka Prefecture University, and Director of the R&D Center for Plant Factory, etc. 2009-2013**
- **Advisor to President (the end of March; Retirement), Osaka Prefecture University, 2013-2015**
- **Special Honor Professor and International Advisor, State Key Laboratory of Photocatalysis on Energy and Environment, Fuzhou University (P. R. China), 2016-**

Date: 2018.11.26



INTRODUCTION

- Prof. Masakazu Anpo is presently a Special Honor Professor & International Advisor, Fuzhou University in P. R. China after retirement of Osaka Prefecture University (at the end of March in 2015) where he worked for 40 years and served as Dean of Graduate School of Engineering (Faculty of Engineering), Vice President and Executive Director, the Director of the R&D Center for Plant Factory, etc. and Advisor to President for last 10 years.
- He is a pioneer in the research of photochemical reactions on solid

surfaces (Heterogeneous Photochemistry) including catalysts and has published the first book in this field, "Photocatalysis" in 1988 from Asakura-shoten in Tokyo and "Photochemistry on Solid Surfaces" in 1989 from Elsevier. He published many important and instructive books such as "Environmentally Benign Photocatalysts" in 2010, "Plant Factory Using Artificial Light" in 2018 from Elsevier, "Chemistry of Silica and Zeolite-based Materials" in 2019 from Elsevier. Until today, he has published more than 115 scientific books including a recent

new book entitled “Current Developments in Photocatalysis and Photocatalytic Materials” in 2020 from Elsevier with Profs. Xinchun Wang and Xianzhi Fu of Fuzhou University.

- Prof. Anpo has published over 547 original peer-reviewed papers in English, being cited more than 40,000 times. His dream is the establishment of “Solar Chemistry” as a new sustainable environmentally-friendly science and technology. Currently, he has an interest in the hybridization of artificial photosynthesis (photocatalysis) and natural photosynthesis, which leads to an efficient production of clean H₂ from water involving wasted biomasses and safe and reliable vegetables under utilization of sunlight effectively.
- Prof. Anpo is the Editor-in-Chief of the International Journal, *Research on Chemical Intermediates* (*Res. Chem. Intermed.*) (Springer). He is one of only a few Members of the Academia Europaea from Asia

(2008). He is a member of Science Council of Japan (2011). He is currently elected as an Honorary Fellow of Chinese Chemical Society (December, 2019). He served as an Executive Director of the Association of Catalysis Societies (IACS), Catalysis Society of Japan and Asia-Pacific Association of Catalysis Societies (APACS).

- One of his research topics deals with the design and development of highly efficient visible-light-responsive photocatalysts and their application to decompose water into H₂ and O₂ with a separate evolution. The development of highly dispersed transition metal oxide single-site heterogeneous catalysts within the framework of meso-porous materials such as zeolites and their applications as efficient photocatalysts for environmental remediation and the production of clean energies using sunlight is another his research topic. Finally, his dream is the establishment of “Solar Chemistry” as a new sustainable environmentally-friendly science and technology.

Topic : The Science and Technology of Catalysts from fundamentals to industrial applications

ABSTRACT

Energy depletion and environmental pollution on a global scale are the most serious and urgent issues facing mankind in recent times. It is, thus, of vital importance to develop effective catalytic systems for novel and clean energy production such as the conversion of CO₂ released in air into useful materials by utilizing natural energy. Such developments will allow sustainable economic growth and development without environmental destruction or pollution. Various approaches have been intensively investigated to address these issues and trials have also been successfully carried out.

In the past century, research on various catalytic and photocatalytic systems have been carried out using various kinds of catalysts such as metals, metal oxides, metal sulfides, chalcogenides, zeolites, porous materials, metal-organic frameworks (MOFs), as well as organic polymer semiconductors. However, to achieve higher efficiency and highly selective catalytic systems, innovative breakthroughs are still strongly desired.

In this lecture, I would like to introduce the great achievements of prominent scientists in the catalysts field so that we can learn from their valuable works and words. In the first part of the lecture, I will present a short history of the development in catalytic science and technology including the works of Nobel Prize winners in Chemistry whose work is related to catalysis. Especially, I want to introduce a couple of masterpieces on the NH₃ synthesis from H₂ and N₂ and the automobile three-way catalysts. These are special and very instructive to understand catalysis from its fundamentals to its present industrial applications.

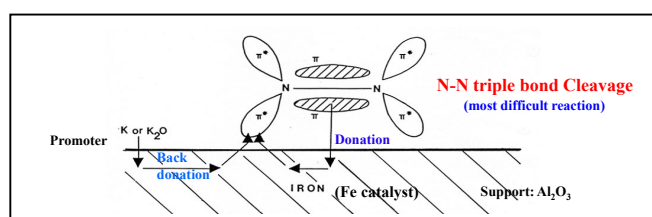


Fig. 1. Elucidation how to dissociate a strong N-N triple bond of N₂ to form N-atoms on Fe catalysts and the role of promoter of K (or K₂O). Nobel Prize in Chemistry; Prof. Fritz Haber in 1918, Prof. Carl Bosch in 1931, and Prof. Dr. Gerhard Ertl in 2007.

In the second part of the lecture, I will present a research progress on Ti-oxide based photocatalysts and their practical applications from the past to present, and future. Especially, I want to introduce our challenges how to utilize unlimited clean solar energy for the efficient production of clean H_2 from H_2O by integration of photocatalytic system with natural photosynthesis in plant factory.

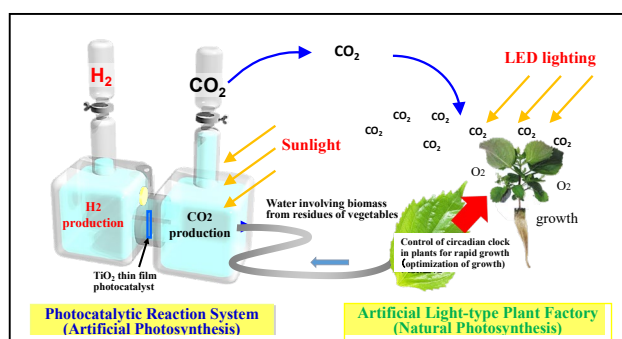


Fig. 2. H_2 production H-type photocatalytic reaction cell using a visible light-responsive TiO_2 thin film photocatalyst. (an efficient H_2 production from H_2O involving wasted biomass under sunlight irradiation (left part)) and artificial light-type plant factory (right part)

I would also like to introduce the life of the late Mr. Toyosaburo Taniguchi who was the president of Toyoboseki Co., now called Toyobo, which one of the largest textile and chemical materials companies in Japan. He became one of the representatives of Japanese textile manufacturers and the chief negotiator during the trade conflicts between the US and Japan in the 1950's and 60's. During these very difficult trade talks, he realized that, at that time, Japan was very isolated and not well understood by other nations.

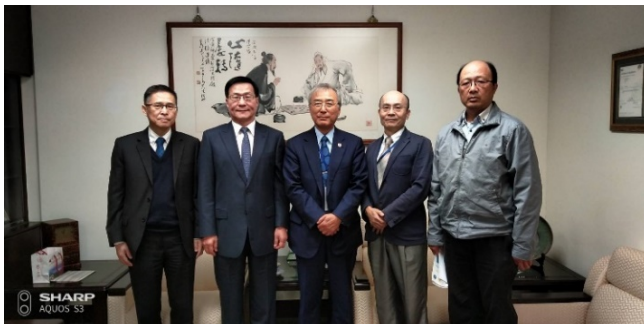
He realized firsthand the great need for Japan to have close relationships and friendships with other countries. He, thus, contributed a great deal of his personal fortune to establish the Taniguchi Foundation to support basic research in various fields including catalysis through international symposia. Since then, Japan's scientific research and international collaborations have expanded greatly, clearly showing how important Mr. Taniguchi's vision was. I have also made many close friends and started many research collaborations thanks to being invited and giving chances to organize these Taniguchi conferences in catalysis.

Finally, I hope and want to encourage that young scientists and students will try their best not only to do good research work but also to cultivate international friendships and collaborations in order to enhance the quality of both their work and lives. In my research work and friendships, I greatly value my close relationships with foreign colleagues from around the world. These friends and collaborators from Europe, the US and Asia helped me very much and I will always consider them to be my closest friends. My dream is that this younger generation of scientists and students will also have good international relationships. So, to end my talk, I wish you all the best of luck and success in your future work and friendships. Thank you very much!

MINUTE



Memorandum of cooperation between TKU of Science and HCM City University of Technology, Dalian University, Tay Nguyen University



President of TKU, Dr. Huan-Chao Keh, received Prof. Anpo and TKU colleagues



Chairman of the Board, Dr. Flora Chia-I Chang received Prof. Anpo

- Prof. Masakazu Anpo visited Tamkang University on November 22-28 in 2018. Prof. Zhou Zicong, Dean of TKU of Science, gave a reception. In cooperation with the Vice President of HCM City University of Technology, Vice President of Da Lat University and Vice President of Tay Nguyen University, the "College to College, College to University, College to University" cooperation

memorandum signing ceremony and discussion on future cooperation were held at C308 in the Chemistry Hall.

- Before the Chair Lecture at TKU, Prof. Masakazu Anpo visited President, Dr. Huan-Chao Keh and Chairman of the Board, Dr. Flora Chia-I Chang. Warmest welcomes were presented to The Seconded Chair Lecture.



Group photo of all attendants for the sixth TKU-OPU-HCMUT-DLU-TNU Joint Symposium



Group photo of all attendants for the Tamkang Clement Carrie Chair



Dr. Masakazu Anpo took a photo as a souvenir with the Tamkang Clement Carrie Chair sign board

- As the founder of the conference, The 6th TKU-OPU-HCMUT-DLU-TNU Joint Symposium on Chemistry and Natural Sciences Address and give a speech at the conference.
- During the Lectures, science faculty and students were crowded at the international conference center to listen to the two-hour chair speech on the Science and Technology of Catalysts from fundamentals to industrial applications. When delivering his speech, Prof. Anpo received great attentions from the audience, and interacting with the audience during the Q&A session successfully.