

Honorary Doctor of Science Professor Michael GRAETZEL



Public Orator Professor Alex JEN Kwan-yue

Mr Council Chairman:

In the 1970s, long before “clean energy” and “climate change” became household terms routinely invoked in public debates, Professor Michael Graetzel, then a Petroleum Research Foundation Post-Doctoral Fellow at the University of Notre Dame, US, was concerned that the planet might one day run out of fuel. The Oil Crisis in 1973 created an international energy shortage, setting off a contest among scientists searching for alternative energy sources. Having dedicated many years of his career to exploring solar energy, Professor Graetzel has emerged as one of the best from what he describes as a “friendly competition” in the scientific community.

As Professor and Director of the Laboratory of Photonics and Interfaces at École Polytechnique Fédérale de Lausanne, Professor Graetzel has pioneered research on energy and electron transfer reactions in mesoscopic systems and their use to generate electricity and chemical fuels from sunlight. He is known for his discovery of dye-sensitised solar cells, which mimic the process of photosynthesis in plants, i.e. when light is absorbed by the green chlorophyll molecules it generates positive and negative electric charges that can then be collected as electric current. The material he uses to harvest light consists of dyes made from substances readily available in nature. Simple and elegant, this method has revolutionised the design of solar cells and represented the most exciting breakthrough in the recent history of photovoltaics.

Since then, Professor Graetzel's work has continued to grow along a similar trajectory. From dye-sensitised solar cells, he developed perovskite solar cells, which are more efficient than other kinds of emerging solar cells up to this point. Perovskite solar cells operate similarly to dye-sensitised cells but use thin films of metal halide perovskites as light-harvesting materials. Just as light can be split into positive and negative charges, another of Professor Graetzel's current projects is to split water into its components, hydrogen and oxygen. Professor Graetzel is also involved in reducing carbon dioxide in the atmosphere using sunlight. All these efforts are finding their way through commercialisation into our daily lives and will go a long way to reverse the effects of greenhouse gases.

Professor Graetzel's achievements have attracted wide international recognition. His inventions have led to over 3,000 patents covering the practical application of dye-sensitised solar cells. His over 1,800 publications have received some 460,000 citations with an h-index of 296, a testament to the extensive impact of his scientific work. Professor Graetzel has received many honours and awards, including the Millennium Technology Grand Prize, the Faraday Medal, the Balzan Prize, the BBVA Foundation Frontiers of Knowledge Award, the first International Prize of the Japanese Society of Coordination Chemistry, the Marcel Benoist Prize, the Global Energy Prize, King Faisal International Science Prize and Rank Prize for Optoelectronics.

Professor Graetzel earned his PhD in Physical Chemistry from the Technical University of Berlin and has received more than ten honorary doctorates from European and Asian universities. He is an elected member of several prestigious academies, such as the Royal Society (UK), the Chinese Academy of Sciences, the German Academy of Sciences (Leopoldina), the Royal Spanish Academy of Engineering and the Swiss Academy of Technical Sciences. His presence is widely sought after in research circles, and he has received invitations to join visiting professorships in universities worldwide.

Reaching out to the broader public to familiarise them with the sciences has been Professor Graetzel's long-standing commitment. Despite his demanding schedule, he regularly finds time to go into primary schools and high school classrooms to conduct workshops with students so that they can observe science in action. His outreach also involves working adults, for he believes it is essential to awaken our sense of wonder.

Over the years, Professor Graetzel has trained and collaborated with many scientists worldwide. He stresses the importance of solid fundamental mathematics and science training to budding young scientists. While strong motivation and passion will no doubt sustain a flagging spirit, Professor Graetzel thinks solitary moments of reflection when one's thoughts deepen can revive one's interest in work. For him, the piano, for which he has a particular aptitude, provides those precious moments.

Mr Council Chairman, Professor Michael Graetzel is a renowned international scientist. His discoveries and inventions have opened up new frontiers in molecular photovoltaics, promising possible solutions to the pressing climate change issues we face today. His commitment to spreading scientific knowledge to the broader public is equally admirable. Mr Council Chairman, it is my pleasure to present to you Professor Michael Graetzel for the conferment of a Doctor of Science, *honoris causa*.