Light-related Electrochemistry in the 21st Century

Kazuhito HASHIMOTO

During the 20th century, humankind was able to develop an extremely comfortable lifestyle thanks to developments in science and technology. The price to pay, however, was the rampant and massive consumption of precious fossil fuels that were formed and preserved during the Earth's 4.6 billion-year history. Rapid consumption of these fossil fuels in the late 20th century has resulted in an energy crisis and probably global warming, problems which are intricately tied to the very survival of the human species.

In light of this situation, the science and technology of the 21st century must follow a different track than the science and technology of the previous century. Rather than a model based on consumption, we must create a model based on sustainability. In other words, energy must not be regarded as merely a resource that we “consume,” but a commodity that we “create and use.”

It is clear that electrochemistry plays an extremely important role in both energy production and its transportation stages. In particular, the electrochemistry concerned with light may potentially provide completely novel methodology towards the development of new energy systems. Fusion of light-related electrochemistry with newly developed technologies in nanotechnology and biotechnology may allow these systems to be realized. In the 21st century, we electrochemists should wrestle with these difficult but challenging issues.

Kazuhito HASHIMOTO
Professor,
The University of Tokyo