Special Issue on Smart Sensors for Chemical and Agricultural Applications

Preface

To achieve Society 5.0, it is necessary to deploy a wide variety of sensors in physical spaces. In the future, many sensors will be needed in fields such as medicine, life sciences, and agriculture, but owing to issues such as power consumption and cost, it is not realistic to deploy many individual sensors. I believe that one solution to this problem is edge AI sensing devices. It is essential to integrate a wide variety of sensors into a small chip, detect feature values using CMOS integrated circuit technology, and output meaningful information. Such devices can be realized through the fusion of sensor technology and semiconductor integrated circuit technology. I believe that this will lead to the creation of new services that will solve various social problems.

If we look back at the history of society, there are many examples of new sensor technology giving rise to new industries and services. The scanning tunnelling microscope (STM), which was developed out of a strong desire to clarify the state of surfaces at the nanoscale, and the atomic force microscope (AFM), which evolved from the STM, have become widely used as a means of easily observing the nanoworld and have helped to give birth to the nanotechnology industry. The birth of many sensing technologies began with the pure desire to "see" and "understand" phenomena that no one had seen or measured before. However, when humanity has the means to make this possible, I believe we will be able to transcend the dimension we are in now and be born into a new dimension, giving rise to new industries and services.

In this special issue, I have been able to gather together papers on smart sensors that can efficiently acquire healthcare information, life science information, and agricultural information, based on semiconductor integrated circuit technology. The papers I have gathered include not only sensor devices, but also papers on new applications that have been born through collaboration with researchers in different fields. I hope that these technologies will give rise to a new sensor market. However, to implement these technologies in society, it is necessary for people in the world to use the various sensor technologies that researchers are developing. If they do not actually appear in the world as products, they cannot be said to have been useful to society. For this reason, I strongly feel that the researchers who developed them should not be satisfied with the proof of principle but should instead be developing sensors with social implementation in mind, and considering business models that will be accepted by society. I believe that it is the responsibility of researchers to tackle social implementation with the enthusiasm of creating a new industrial field.

Finally, I would like to thank the staff of *Sensors and Materials* and the reviewers who helped with this project. I would also like to thank Tomoko Tanabe of MYU K.K. for her hard work on this special issue. I hope that this special issue will lead to the creation of smart sensor systems that are actually implemented in society.

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