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Carbon is a traditional and well-known material and has been employed mainly for electrochemical devices including batteries, fuel cells, and chemical and biosensors. This is because carbon materials have sufficient conductivity and electrochemical activity for electrode applications and are also inexpensive. Various electrode materials have been fabricated such as carbon fiber, carbon black, and carbon felt, which have a wide surface area suitable for batteries and sensing materials. In contrast, carbon film electrodes have also been improved using vacuum technologies including sputtering and chemical vapor deposition. These film electrodes are convenient since they can be fabricated into any shapes and sizes to develop micro- and nanostructured electrodes. More practically, printing technology using newly developed carbon inks have been developed for flexible, wearable, and disposable sensing devices and considered to be applied in future health care devices combined with the Internet of Things (IoT).

Recently, new carbon materials including carbon nanotubes (CNTs), graphene, and boron-doped diamond (BDD) have been reported. CNTs and graphene have unique characteristics such as high electrocatalytic activity and unique optical property. In contrast, BDD electrodes are extremely stable and show a wide potential window. Owing to the above-mentioned unique performances and wide variety of structures of carbon materials, various kinds of chemical and biochemical sensors have been developed on the basis of such carbon materials. This special issue will focus on traditional and new carbon materials for biosensors; environmental, electrochemical, and optical sensors; and microfluidic devices. Finally, we would like to thank Professor Makoto Ishida, the Editor-in-Chief, Professor Kohji Mitsubayashi, the Associate Editor, and Ms. Misako Sakano for this opportunity to edit this special issue for Sensors and Materials, and we also thank all the authors and reviewers for their support.

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