Special Issue on Advanced Microfabrication Processes for MEMS/NEMS

Preface

Microfabrication processes are the most essential base technology for micro/nano-electromechanical systems (MEMS/NEMS) but they are not usually described in detail in journal papers, partly because they are considered as confidential know-how and mainly because they are regarded as mere techniques that would not be regarded as universally applicable. Nevertheless, the emergence of new fabrication technologies is always a game changer in the field of MEMS/NEMS, as can be seen for deep reactive ion etching (DRIE) as well as for the anisotropic wet etching of silicon, which was well documented in the legendary review paper of K. E. Petersen published in 1982. In the hope that the influence of microfabrication will bring about another technological change, this special issue of *Sensors and Materials* will focus on state-of-the-art microfabrication processes for MEMS/NEMS.

Five research papers are included in this special issue. The first paper reports on a new method of constructing layered atomic structures of two-dimensional materials such as graphene and hexagonal boron nitride using the van der Waals force. This new technique must be inspiring for researchers seeking new added value for MEMS/NEMS. The second paper proposes a wafer-bonding process to produce MEMS vibrational energy harvesters. The readers will be surprised to find that the mechanism of anodic bonding is essentially the same as the method creating an electret charge in silicon oxide. The third paper deals with an extended version of the electret material that can be used to tune the device performance after fabrication, possibly beyond the manufacturing error. The fourth paper is also related to an electret material that is a vacuum-deposited chemical complex. Unlike typical electrets, this new functional has a very strong polarization owing to the self-assembled molecular structures during deposition. The fifth paper introduces a UV-curable polymer material that can be shaped into microstructures when UV-exposed through a photomask. The readers will find another surprise that a concept of "metamaterial" is also applicable to mechanical structures.

Looking back on these papers later, I realized that advanced microfabrication processes always come with new materials. New combinations of materials and processes will further expand the variety of MEMS/NEMS applications, limited only by the designer's imagination.

I would like to extend my gratitude to the staff members of *Sensors and Materials* and all the participating reviewers. I would especially like to thank Ms. Tomoko Tanabe of MYU K.K. for her commitment to this special issue. In this world that is about to be run by artificial intelligence, I feel it is reassuring for authors and readers alike to know that all these editorial tasks are being handled in a human way.

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