EDITORIAL

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Preface to the Special Issue on Flexible Materials and Structures for Bioengineering, Sensing, and Energy Applications

Guest Editors

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Human body with curved and soft interfaces requests advanced flexible materials and structures for the interaction with organs and signal collection from targets in applications such as bioengineering and diagnostic devices. Among them, it is highly demanded to achieve creative design in flexible materials and structures with great stretchable capability for required applications. To this end, both inorganic and organic materials could be adopted and designed with assembly and self-assembly methods for flexible electronics and electrodes. Soft or flexible materials and structures inspired by nature can lead to highly conformal contacts between devices and the human body. These approaches hold great potential for applications in flexible electronics, medical imaging technology and portable disease diagnostics. Novel strategy on related sensors/actuator and energy storage/generation devices could overcome certain limitations on flexible materials engineering and thus advance the field as well. All these methods would deliver a profound impact to our future intelligent society.

This special issue comprises two pieces of creative research work and seven high-quality comprehensive review papers, covering a set of wide topics ranging from fundamental flexible structure design to advanced bioengineering, sensing and energy devices. Skin-inspired and inorganic thin-film based flexible electronics are summarized by Bao *et al.*[1] and the Lin group[2], respectively, from the fabrication strategies to the as-assembled devices. Some specific devices based on flexible materials and structures are also reported here. Yu and his co-worker[3] review the progress of flexible halide perovskite solar cells, a promotion to the sustainability of perovskite solar productions. Recent advanced methods for morphable 3D mesostructures (e.g. thermally actuated reconfiguration, magnetically actuated reconfiguration and electrically actuated reconfiguration etc.) are concluded and discussed by Zhang *et al.*[4]. Various deformable and stretchable sensors based on nanofiber or nanowires are introduced by Wang, Shen, *et al.*[5], to show their great potential in biomedical and robotics. In the field of optoelectronic devices, a review on GaN-based micor-LEDs is reported by Tian's group[6], which systematically describes the related principles and prospective applications. Besides, Ladoux and his colleagues[7] show a commentary on semiconductor-based techniques that advance the study of cell or tissue mechanical responses to substrate properties to explore the study of mechanobiology. Mei and his colleagues[8] report a 3D optical microcavity, introducing their effective flexible structure rolling-up technique. Shen *et al.*[9] study a method suitable for flexible structures manufacturing through the assembly of SnS nanowire arrays based near infrared photodetectors.

All together, the editors hope that this special issue can provide readers an overall conception on the research of flexible materials and structures with related applications including bioengineering, sensing and energy devices. We also hope the reviews and articles in this special issue can inspire and encourage researchers to explore into new visions such as the finding new flexible materials and developing effective technologies, to serve for a highly integrated and intelligent society in the coming soon. Last but not least, we would like to thank all the authors who have contributed high-quality peer-reviewed articles to this special issue.

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