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PREFACE

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Special Topic on Flexible Polymer Electronics

Flexible polymer electronics have emerged as an important research frontier in materials science due to their unique advantages, including mechanical flexibility, lightweight characteristics, and solution processability. These features enable a wide range of emerging applications such as wearable electronics, electronic skins, and biomedical devices, *etc*. In recent years, much advances in polymer chemistry, device physics, and interface engineering have significantly improved the performance of flexible polymer electronic devices, accelerating their transition from fundamental research to practical applications.

To highlight recent progress and emerging directions in this rapidly developing field, *Chinese Journal of Polymer Science* (CJPS) has organized this Special Topic on Flexible Polymer Electronics, which includes 1 review article and 9 research papers contributed by leading researchers in the field. These contributions cover several important aspects of flexible polymer electronics, including advanced polymer materials, device engineering strategies, and novel flexible electronic applications. Di *et al*. summarized processing strategies for organic thermoelectrics, highlighting the roles of solution processing, patterning, and large-area fabrication in determining microstructure and device performance, and outlining current challenges and future directions for flexible thermoelectric devices in the review.

The research articles can be broadly categorized into three key themes:

(1) High-performance optoelectronic devices: Chen *et al*. demonstrated that a crystalline polymer buffer can suppress donor layer erosion and optimize vertical phase separation, resulting in high device efficiency. Sun *et al*. showed that a bis-phosphonic acid-functionalized carbazole affords a dual hydrophilic interface, forming a bilayer hole-transporting layer that enhances performance. Liu *et al*. reported an elastomer-doping strategy in which polyurethane is incorporated into thermally activated delayed fluorescence (TADF) polymers, producing composite films with remarkable TADF characteristics and improved mechanical robustness, and enabling high-performance stretchable organic light-emitting diodes (OLEDs).

(2) Mechanically adaptive and stretchable functional polymers: Han *et al*. introduced a plasticizer-assisted strategy to produce low-crystallinity films with improved chain alignment, enhancing stretchability and charge mobility. Wang *et al*. reported the development of conjugated room-temperature phosphorescent polymers with tailored π-conjugation that achieve high phosphorescence efficiency and demonstrate practical potential in oxygen film sensors. Qin *et al*. introduced a one-pot multicomponent polymerization to produce main-chain charged polyelectrolytes with intrinsic aggregation-induced emission, showing fluorescence enhancement, excellent thermal stability, and potential multifunctional applications. Li *et al*. reported photo-crosslinked nonlinear optical polymer films with large second-order nonlinear coefficients and high thermal stability, providing a strategy to overcome the nonlinearity-stability trade-off in flexible polymer systems.

(3) Patternable and scalable fabrication strategies: Liu *et al*. reported a four-armed diazo-based photo-crosslinker enabling high-resolution patterning of polymer semiconductors while preserving charge transport, providing a promising route for solution-processed flexible electronics. Ma *et al*. demonstrated an electropolymerization strategy to fabricate spin-coating-free PEDOT:PSS hole-injection layers with smooth morphology and suitable energy levels, leading to enhanced hole injection and improved OLED performance.

We hope that this Special Topic will provide a timely overview of recent advances in flexible polymer electronics and stimulate further research and collaboration across related disciplines. Finally, we would like to express our sincere gratitude to all the authors who contributed their excellent work to this Special Topic. We also thank the reviewers for their careful evaluations and constructive comments. Our appreciation also goes to the editorial team of the CJPS for their strong support and professional assistance throughout the preparation of this Special Topic.

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