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Women in Emerging Organic and Hybrid Electronic Materials and Interfaces

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The joint special issue "Women in Emerging Organic and Hybrid Electronic Materials and Interfaces" celebrates the scientific excellence, creativity, and leadership of women researchers at the forefront of organic and hybrid electronics. Launched in honor of the International Day of Women and Girls in Science, this initiative presents a compelling collection of original research and perspectives that exemplify the rigor, imagination, and interdisciplinary spirit of women-led work across materials science, physics, chemistry, and biology.

This editorial presents a selection of recent publications selected for the Advanced Electronic Materials audience with a focus on bioelectronics, energy systems, and optoelectronics. Here, in the area of hydrogel engineering, Zhan et al. (202400214) report the synthesis of stretchable, self-healing hydrogels with integrated electrical conductivity and antibacterial properties. These materials are designed for use in soft robotics and bioelectronic sensors. Finster et al. (202400763) complement this with a review of data-driven methods, highlighting the role of computational tools and machine learning in guiding hydrogel formulation for tissue engineering and biosensing applications. Moving to plant bioelectronics, Allarà et al. review (202500080) the functional use of nanomaterials in agriculture, focusing on nutrient delivery and stress resistance. Toward engineering of new materials and device architectures, organic electrochemical transistors (OECTs) are the focus of work by Priyadarshini et al. (202400681) and Simotko et al. (202500085). Both papers propose novel strategies for modulating transistor behavior through material design, expanding their application range in bioelectronics. The work by Ramirez et al. (202500123) is instead focused on OECT facilitating fabrication processes through inkjet printable semiconducting inks development. In polymer synthesis, Lin et al. (202400756) present a series of semiconducting polymers that combine mechanical flexibility with preserved electrical performance, supporting their integration in wearable electronics.

Energy storage advances are demonstrated by Skorupa et al. (202400761) and Alemdag et al (202400818); both highlight scalable approaches to enhancing electrode performance using structured layers and machine learning.

Photodetector and sensing applications are addressed in papers by Prescimone et al. (202400762), Macchia et al. (202400908), and Seo et al. (202400816), each presenting device-level innovations for infrared light detection or rapid bioanalytical diagnostics. Additionally, Allarà (202500073) et al. introduce conjugated polymer nanoparticles for use in biophotonic applications, combining visible absorption with NIR emission for potential sensing and therapeutic uses. Biocompatibility and biofunctionality are further explored by Polz et al. (202400899), confirming the non-cytotoxic behavior of PM6:Y6 photovoltaic films in physiological environments. Shalom et al. (202500105) expand this with the development of magnetic collagen gels that enable magnetothermal stimulation, offering promise for remote cell activation in regenerative therapies. Neural interface technologies are exemplified by Koschinski et al. (202500088), who report on the fabrication of high-density flexible neural implants with submicron resolution, optimized for in vivo signal fidelity and spatial precision. Foundational studies by Neusser et al. (202400956), Mas-Torrent et al. (202400887), Koc et al. (202400895), and Spies et al. (202500060) explore key material phenomena, including doping, vertical phase separation, and crystallinity, which are factors that determine the optoelectronic performance and stability of organic and hybrid semiconductors. AlSabeh et al.(202500164) further contribute insights into the structural constraints limiting the formation of higher-n phases in layered perovskites, informing future designs for improved device integration. Together, these studies reflect the breadth and depth of current research at the interface of materials science and advanced electronic devices, highlighting strategies that are reshaping the design principles of future technologies.

Conflict of Interest

The authors declare no conflict of interest.

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