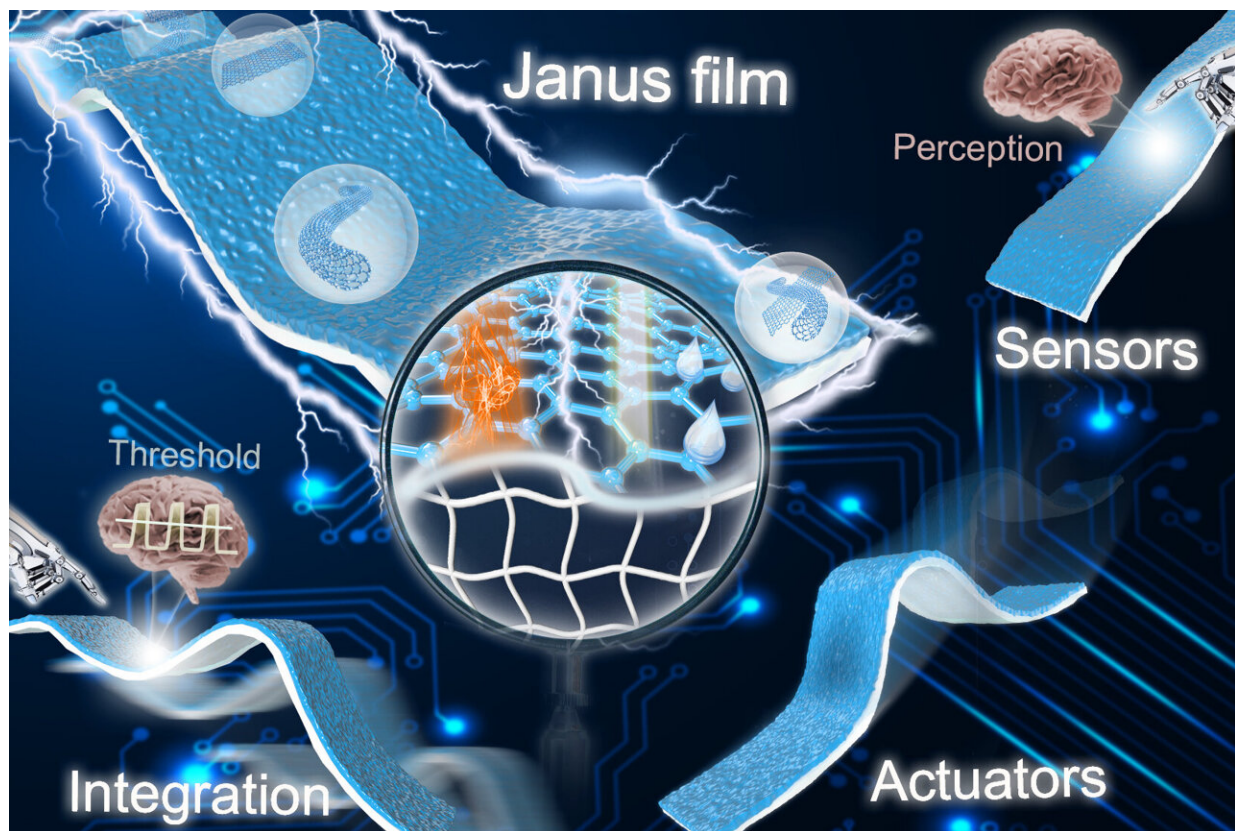


Study sheds light on carbon-based Janus films

February 6 2023, by Zhang Nannan



The carbon-based Janus films for flexible sensors, soft actuators and beyond.
Credit: NIMTE

Unique physical/chemical properties and synergetic multi-functions have given Janus films great potential in sensing, actuation, advanced

separation, energy conversion and storage, etc. Combining the unique advantages of carbon nanomaterials in electrical conductivity, intrinsic mechanical flexibility, chemical and thermal stability, and ease of assembly, carbon-based Janus films have attracted increasing attention from researchers.

Based on the previously reported studies on carbon-based Janus films, Prof. Chen Tao and his colleagues at the Ningbo Institute of Materials Technology and Engineering (NIMTE) of the Chinese Academy of Sciences (CAS) have systematically summarized the significant advances in carbon-based Janus films, focusing on the preparation strategy, the relationship between structure and performance, and the diverse potential applications in sensing, actuation, and integrated devices.

In the review published in *Accounts of Materials Research*, the researchers presented several representative carbon nanomaterials used in flexible sensing/actuating devices, and elucidated their intrinsic structures and physical/[chemical properties](#), providing valuable guidance for material selection according to the desired properties and application scenarios.

In addition, great emphasis has been placed on the overall preparation strategy, including solid-supported physical/chemical approaches, and interfacial engineering techniques based on liquid support.

Additionally, the relationship between the surface/interface structures and the intrinsic properties of the carbon-based Janus films was elaborated in detail.

Moreover, diverse applications of carbon-based Janus films in electronic skins (e-skins), soft actuation, and self-sensing actuating systems were demonstrated, contributing to the development of high-performance epidermal electronics, non-contact sensing devices, light-driven

actuators, self-sensing actuators, and their integration for smart robots.

The current development challenges and future trends of carbon-based Janus films were also illustrated, in terms of the structural design, structural interfaces, and integrated functionality.

It is expected that this [review](#) will shed light on further research on carbon-based Janus films, and attract interests of researchers from different backgrounds, thus creating new opportunities.

More information: Wei Zhou et al, Carbon-Based Janus Films toward Flexible Sensors, Soft Actuators, and Beyond, *Accounts of Materials Research* (2023). [DOI: 10.1021/accountsmr.2c00213](https://doi.org/10.1021/accountsmr.2c00213)

Provided by Chinese Academy of Sciences

Citation: Study sheds light on carbon-based Janus films (2023, February 6) retrieved 27 April 2024 from <https://phys.org/news/2023-02-carbon-based-janus.html>

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