# 2D Materials Ratchet Up Biorealism in Computing: Bridging the Gap between Nature and Technology

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## INTRODUCTION

In the relentless pursuit of advancing computing technology, researchers are turning to a fascinating realm of materials known as 2D materials to enhance biorealism in computing. These ultrathin substances, often just a few atoms thick, are revolutionizing the way we approach the convergence of technology and biology. The integration of 2D materials in computing promises not only enhanced performance but also a closer mimicry of biological processes, bringing us a step closer to achieving seamless human-computer interaction.

## DESCRIPTION

Graphene, the first discovered and most famous 2D material, opened the floodgates to a plethora of two-dimensional wonders. Graphene's extraordinary electrical, thermal, and mechanical properties laid the foundation for exploring other 2D materials like molybdenum disulfide ($MoS_2$), black phosphorus, and hexagonal boron nitride (hBN). These materials exhibit unique electronic characteristics that make them ideal candidates for applications in computing. Biorealism in computing refers to the emulation of biological processes and structures in electronic devices. This concept aims to create systems that not only perform complex computations but also interact with the human body and other living organisms in a way that closely resembles natural processes. Achieving biorealism is crucial for applications such as brain-machine interfaces, prosthetics, and biocompatible computing devices. One of the key advantages of 2D materials in computing is their ability to enhance device performance and energy efficiency. These materials offer excellent carrier mobility, allowing for faster electron transport and reduced power consumption. The ultrathin nature of 2D materials also enables the creation of more compact and lightweight devices, making them particularly attractive for wearable and implantable technologies. The structure and function of the human brain have long been a source of inspiration for computer scientists. Enhanced performance and efficiency with 2D materials, researchers are making strides in developing neuromorphic computing systems that closely emulate the parallel processing and learning capabilities of biological neural networks. The unique electronic properties of 2D materials enable the creation of synapse-like devices, paving the way for computers that can learn and adapt in a manner reminiscent of the human brain. Beyond their electronic properties, 2D materials offer flexibility and transparency, making them suitable for flexible and transparent electronics. This is particularly relevant for creating biorealistic devices that seamlessly integrate with the human body. Flexible electronics based on 2D materials can conform to the shape of biological tissues, opening up new possibilities for applications such as smart clothing and implantable sensors. While the potential of 2D materials in computing is immense, challenges remain. Scalability, reproducibility, and integration with existing technologies are areas that demand further attention. Researchers are actively exploring methods to address these challenges and unlock the full potential of 2D materials for biorealistic computing. [1-4].

## CONCLUSION

As we navigate the frontier of computing, the integration of 2D materials is proving to be a game-changer. These ultrathin substances are not only enhancing the performance and efficiency of electronic devices but also ratcheting up biorealism in computing. The marriage of 2D materials and biorealistic design principles brings us closer to a future where technology seamlessly interfaces with the natural world, offering unprecedented possibilities for innovation and collaboration between man and machine.

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## CONFLICT OF INTEREST

The author declares there is no conflict of interest in publishing this article has been read and approved by all named authors.

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