Review of: "Critical Review on Carbon Nanomaterial Based Electrochemical Sensing of Dopamine the Vital Neurotransmitter"

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This paper offers a thorough examination of the present status and recent developments in electrochemical sensing techniques utilizing carbon nanomaterials for dopamine detection. Dopamine, an important neurotransmitter, is integral to several physiological and psychological functions, and its precise measurement is critical for detecting nervous system problems. The review emphasizes the growing necessity for dependable dopamine sensors, especially as diagnostics evolve towards more accessible, real-time, and individualized healthcare solutions.

The authors thoroughly examine the benefits of carbon nanomaterials, including graphene, carbon nanotubes, and their derivatives, which possess distinctive features that improve electrode performance. These compounds provide enhanced electron transport, heightened sensitivity, and efficient discrimination from interfering chemicals such as ascorbic acid and uric acid. The paper discusses current improvements in non-enzymatic sensors, which provide advantageous alternatives to enzyme-based sensors by enhancing stability, lowering costs, and streamlining production processes.

The review's strength is its critical assessment of several electrochemical methods, such as cyclic voltammetry, differential pulse voltammetry, and fast-scan cyclic voltammetry. These techniques provide diverse methodologies for dopamine detection, and the authors adeptly evaluate their efficacy across numerous contexts, ranging from laboratory environments to prospective clinical applications.

The authors end by emphasizing the difficulties in the commercialization and practical implementation of these sensors. Future research should prioritize the development of more economical, resilient, and compact sensor technologies, including wearable and implanted devices, to address the increasing need for portable dopamine monitoring. The paper also advocates for enhancements in the selectivity of these sensors in biological samples, tackling challenges presented by analogous electroactive species.

This article provides a comprehensive and informative overview of electrochemical sensing for dopamine with carbon nanomaterials. It offers significant guidance for future research and development in this field, highlighting the necessity of translating laboratory innovations into practical, real-world applications.