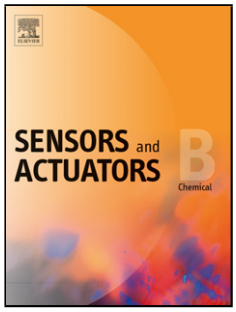

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Detection of Neurochemicals with Enhanced Sensitivity and Selectivity Via Hybrid Multiwall Carbon Nanotube-Ultrananocrystalline Diamond Microelectrodes

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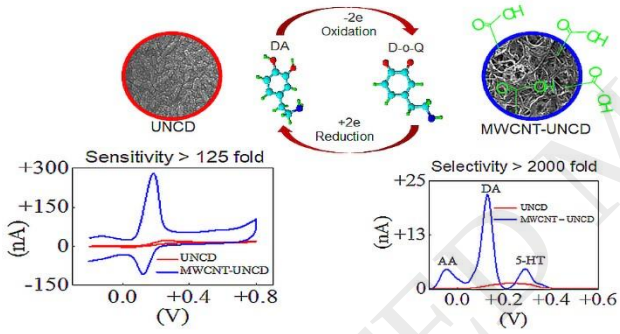
Graphical Abstract



Highlights

- MWCNT-UNCD hybrid microelectrode show remarkable improvements in dopamine detection
- Sensor function is tailored by MWCNT film thickness, structure and functionality
- Hybrid electrode comprises of three regions with varying electrochemical activity
- Highly multiplexed microarray is possible without compromising sensitivity

ABSTRACT

Abnormal neurochemical signaling is often the underlying cause of brain disorders. Electrochemical microsensors are widely used to monitor neurochemicals with high spatial-temporal resolution. However, they rely on carbon fiber microelectrodes that often limit their sensing performance. In this study, we demonstrate the potential of a hybrid multiwall carbon nanotube (MWCNT) film modified boron-doped ultrananocrystalline diamond (UNCD) microelectrode (250-µm diameter) microsensor for