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Tuning the selectivity of nitrogen doped carbon nanotubes using ionic liquid towards electrochemical sensing of dopamine

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Sensitive and selective determination of dopamine (DA) has drawn considerable attention due to its association with various neurological disorders. However, it is hampered due to presence of Ascorbic Acid (AA), a common interfering compound in biological fluids whose concentration is 100-1000 times higher than DA. The key point in developing a highly sensitive and selective electrochemical sensor for DA relies on a suitable probe material capable enough to selectively knock down the interference caused due to AA. Nitrogen doped carbonaceous material have shown their enormous potential in determining AA and DA together but regeneration of DA still remains a formidable task. Here, we present the application of IL (1-butyl 3-methylimidazolium tetrafluoroborate (BMIM BF₄)) and nitrogen doped carbon nanotubes (NCNTs) based composites for the sensitive and selective determination of DA. For this purpose, NCNTs are synthesized by post treatment under NH₃ at different temperatures. Square wave voltammetry and rotating disc electrode measurements suggests superior sensitivity and selectivity of NCNTs-IL composites towards the oxidation of DA in presence of higher concentration of ascorbic acid (500µM). A linear response between the peak current and the concentration of DA has been found to be in the concentration range of 0.001-40µM and 0.001-10µM for individual and even in presence of 500µM respectively.

Biography

Anju Joshi has completed her MTech in Nanotechnology from University of Rajasthan, Jaipur in year 2012. She started the pursuit of her PhD degree at the Department of Chemistry, IIT Ropar under the supervision of Dr. Tharamani C.N. in 2013. She has published two papers in peer reviewed journals. Her research interest focuses on "Development of novel sensors for more effective determination of biomolecules associated with diseased state".

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