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Hydrothermal synthesis of novel $Sm_2(MoO_4)_3$ for selective electrochemical detection of pesticide metol in water samples

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The rapid advancement of technology over the past decade has resulted in significant transformations within the photography sector. In photographic processes, photosensitive materials are used by photographers to convert latent images into visible ones. Among other photographic developers, Metol has been used as a monochrome photographic chemical for more than 100 years in Europe. Metol (MTL), chemically N-methyl-p-aminophenol sulphate with formula $[HOC_6H_4NH_2(CH_3)]_2SO_4$, is also used as a corrosion inhibitor, antioxidant, and antimicrobial, and it serves as an intermediary for the medication diloxanide and dyes for fur and hair [1]. Since it is used in the photographic industry, it is released into the water, contaminating ground, and household water. It can be easily found in different water bodies such as rivers, lakes, ponds, and seas. MTL was found to be a cancerogenic organic pollutant with a significant impact on human health, the environment, animals, plants, and water sources [2]. MTL is non-biodegradable and can accumulate in biotic organisms. It is also related to numerous environmental issues, even in low concentrations. Nevertheless, a larger dose of MTL is necessary to have a substantial effect on several health problems, such as cancer, irritable eyes, slowed heartbeat, skin allergies, and harm to the body's internal blood supply [3]. Therefore, developing a straightforward, quick, affordable, sensitive, and practical method for ML detection in aquatic bodies is imperative.
In this study, a susceptible and selective sensor for the detection and quantification of nitrogen-organic pollutant Metol (MTL) was developed. For this purpose, samarium-molybdate ($Sm_2(MoO_4)_3$ nanoparticles were synthesized by organic solvent-free, eco-friendly, low-cost hydrothermal method and used as an excellent modifier with high catalytic efficiency for implementation into the carbon paste. Electrochemical measurements indicate that the developed electrode facilitates electron transfer processes and enriches the catalytic response. The fabricated $Sm_2(MoO_4)_3$/CPE sensor has a wide linear range of 0.1 to 100 and 100 to 300 µM of MTL with a low detection and quantification limit of 0.047 µM and 0.156 µM at pH 3 in a BRBS, as supporting electrolyte. The results of using this sensor to analyze real water samples from various sources were satisfactory, indicating that this approach can offer an inexpensive, quick, sensitive sensor for ambient MTL monitoring.

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References

1. X. Niu *et al.*, Sensitive Voltammetric Detection of Metol with a TiO? Nanowire Modified Carbon Ionic Liquid Electrode, *Int. J. Electrochem. Sci.* **11(2)** (2016) 1720-1729 https://doi.org/10.1016/S1452-3981(23)15955-4
2. L. Lunar, Identification of metol degradation products under Fenton’s reagent treatment using liquid chromatography-mass spectrometry, *Water Res.* **34(13)** (2000) 3400-3412 https://doi.org/10.1016/S0043-1354(00)00089-0
3. C. Koventhan *et al.*, Efficient Hydrothermal Synthesis of Flake-Like Molybdenum Disulfide for Selective Electrochemical Detection of Metol in Water Real Samples, *Int. .J Electrochem. Sci*. **15(8)** (2020) 7390-7406 https://soi.org/10.20964/2020.08.43