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ELECTROCHEMICAL MODIFICATION OF GRAPHENE WITH MERCURY

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Graphene is a single sheet of sp^2-hybridized carbon with outstanding physical and chemical properties such as excellent electron mobility. [1] Graphene has been investigated as an active material for numerous applications, such as electrodes in sensors and lithium-ion-batteries. [2,3] The application as sensor electrode for analytes with standard electrode potential (E^0) below -0.8 V is limited due to the cathodic hydrogen evolution reaction. Mercury is still the electrode material of choice for such analytes due to its high overpotential for hydrogen evolution. [4] To combine the electrochemical properties of graphene and mercury, we modified the graphene surface through electrochemical deposition of mercury. We focused on optimizing the mercury deposition conditions and surface characterization via Atomic Force Microscopy (AFM), Electron Microscopy (SEM) and X-ray spectroscopic analysis (EDX). Subsequently, the shift of the cathodic hydrogen evolution was investigated. As an example of the performance of the mercury modified graphene electrode, we present the successful reduction of a nickel coordination complex using Square wave voltammetry (SWV).

References

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