

# Formation, surface characterization, and electrocatalytic application of self-assembled monolayer films of tetra-substituted manganese, iron, and cobalt benzylthio phthalocyanine complexes

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## ABSTRACT

Molecular thin films of manganese (SAM-2), iron (SAM-3), and cobalt (SAM-4) phthalocyanine complexes, non-peripherally tetra-substituted with benzylmercapto, were formed on polycrystalline gold disc electrode by selfassembly technique. Surface characteristics of the films were interrogated by cyclic voltammetry. Significant passivation of voltammetry processes associated with bare gold surface (gold oxidation and underpotential deposition of copper) confirmed formation of the films. Electrocatalytic property of the films was evidenced from better voltammetry responses (less positive oxidation potential and better current signal) of the insecticide, carbofuran, on these films, relative to that on bare gold electrode. In terms of less positive oxidation potential, the FePc derivative (3) gave the best response, while the best current signal was observed on SAM-2-modified gold electrode. The average heterogeneous rate constant,  $k$ , for the oxidation of carbofuran was  $3.6 \times 10^{-2} \text{ cm s}^{-1}$  on the SAM film with the best current signal (SAM-2).