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Electrode reaction of ferrocene in nitrobenzene-water emulsion

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Nitrobenzene (NB) including ferrocene was mixed vigorously with the sodium dodecylsulfate aqueous solution to yield oil-in-water emulsion. Voltammograms of the emulsion showed an anodic wave at ca 0.90 V, which was discerned from waves of micellized ferrocene, of directly soluble ferrocene and of ferrocene in NB. The anodic wave was due to the adsorption on oil droplets including ferrocene. The cathodic wave was only the reduction of the soluble ferrocenium ion at 0.15 V. Consequently, ferrocene behaves as irreversible system in the emulsion. The emulsion was gradually separated into the oil and the aqueous phases at 1.2 V. A reaction mechanism suggested is adsorption of droplets at the electrode, application of the potential at the oil|water interface of the adsorbed droplets, an increase in the interfacial energy, coalescence of the droplets, dispersion of ferrocene in the water phase, and the oxidation at the electrode.