

SUPPLEMENTARY MATERIAL

Three-phase electrodes: simple and efficient tool for analysis of ion transfer processes across liquid-liquid interface—twenty years on

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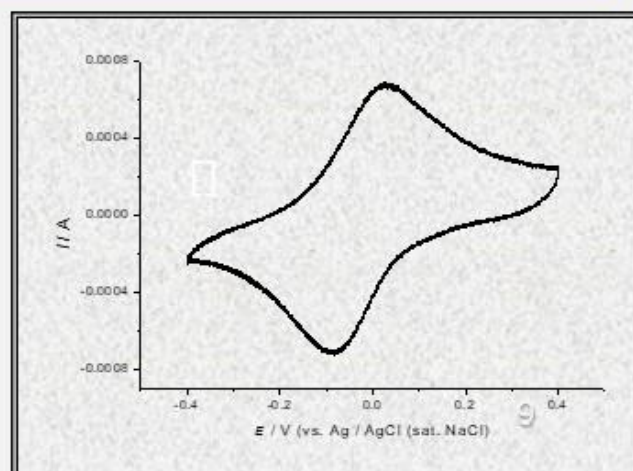
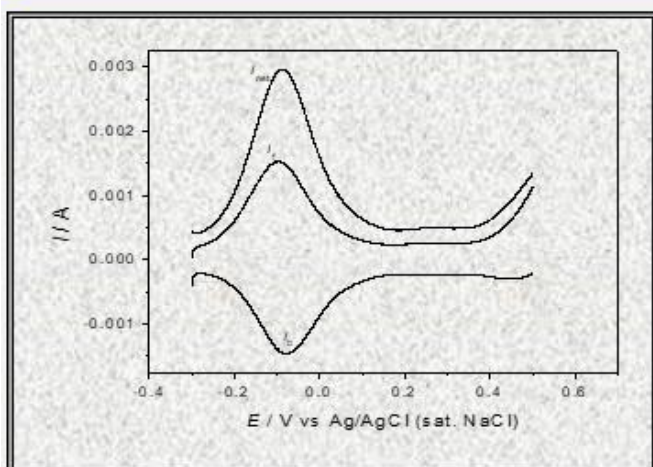
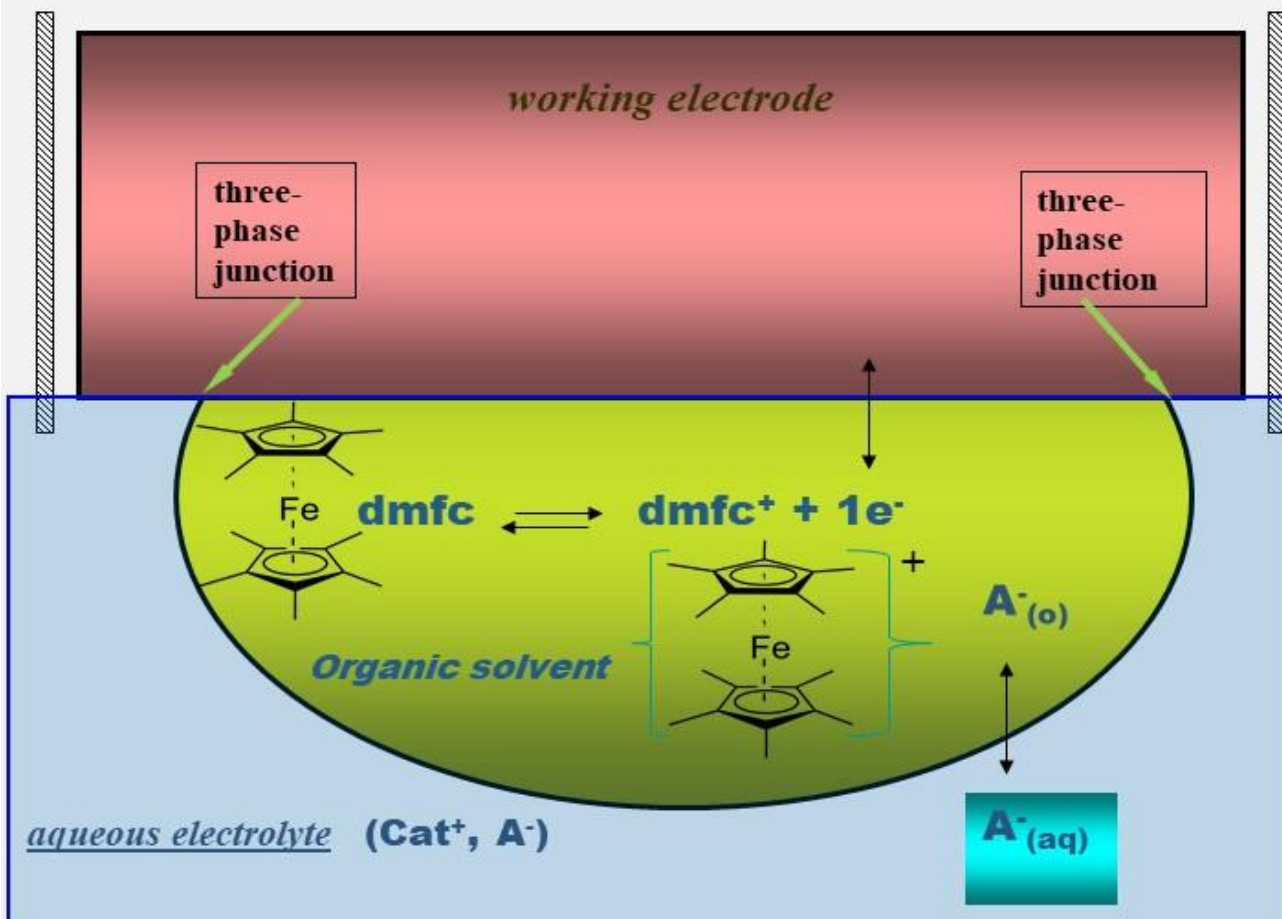
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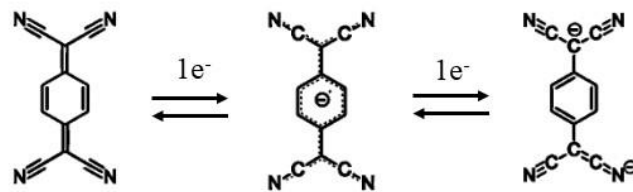
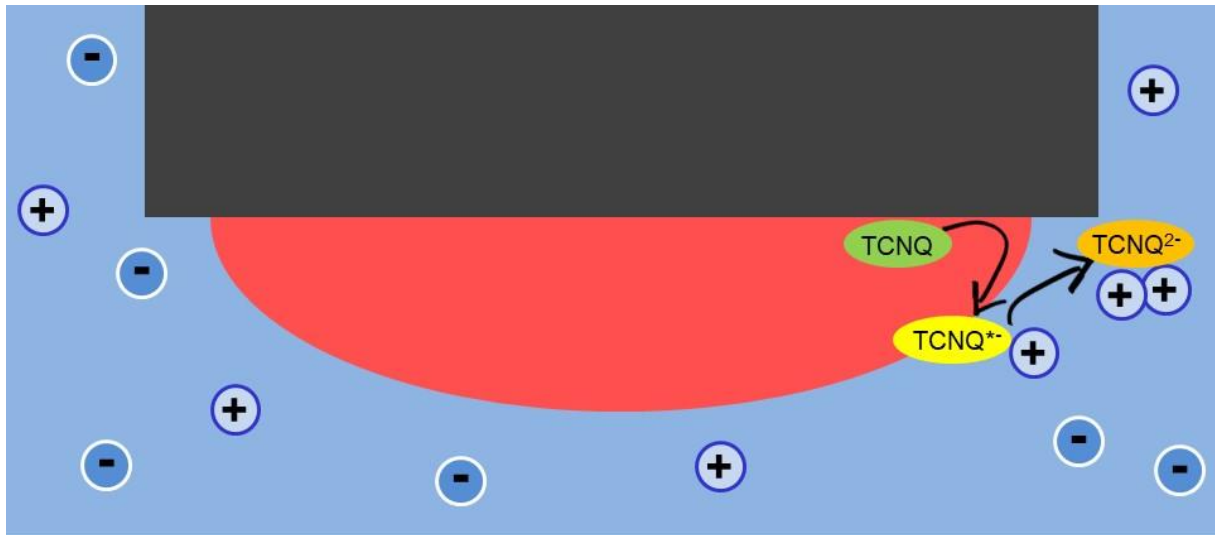
Abstract

The three-phase electrode methodology applied for studying ion transfers across an interface between two immiscible liquids is simple and efficient tool to get insight into the activity of many ionizable drugs and physiologically active substances that can exist in ionic forms. Exactly 20 years ago, the group of electrochemists led by Fritz Scholz, Sebojka Komorsky-Lovric and Milivoj Lovric, invented this set up to get access to the thermodynamics of ion transfers across liquid/liquid interface. Within the last twenty years, the three-phase electrodes have been applied to get access to important phenomena such as: thermodynamics of interfacial chemical reactions, kinetics of ion and electron transfer, interfacial catalysis, recognition of chiral ions, synthesis of nano-particles, and biosensor development are some of the milestones achieved by application of three-phase electrodes. While elaborating briefly major achievements, future perspectives of this simple, but powerful electrochemical tool, have been also envisaged.

reference electrode

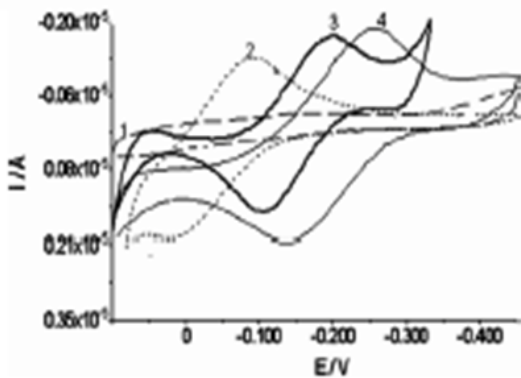
counter electrode



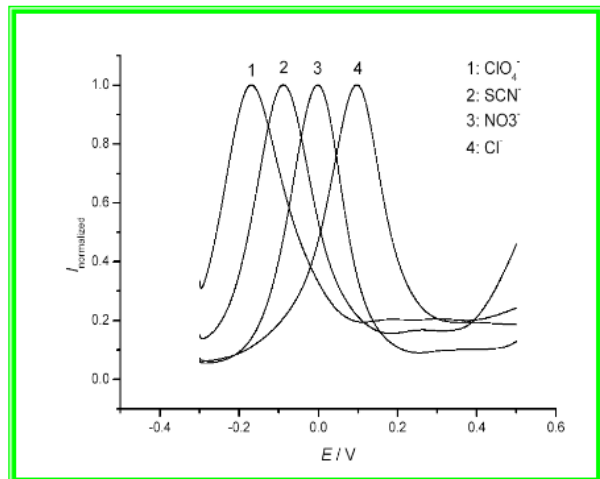


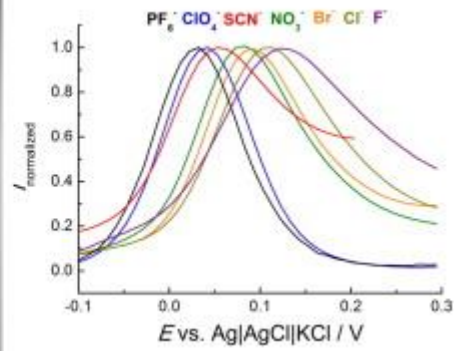
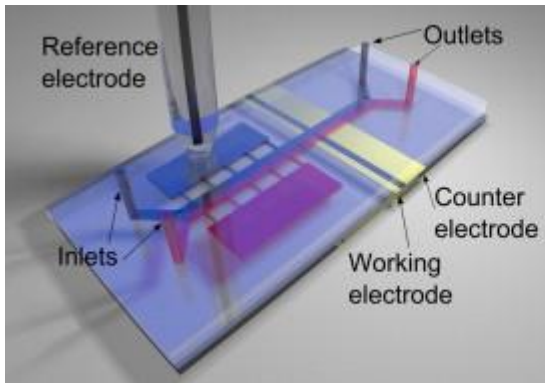
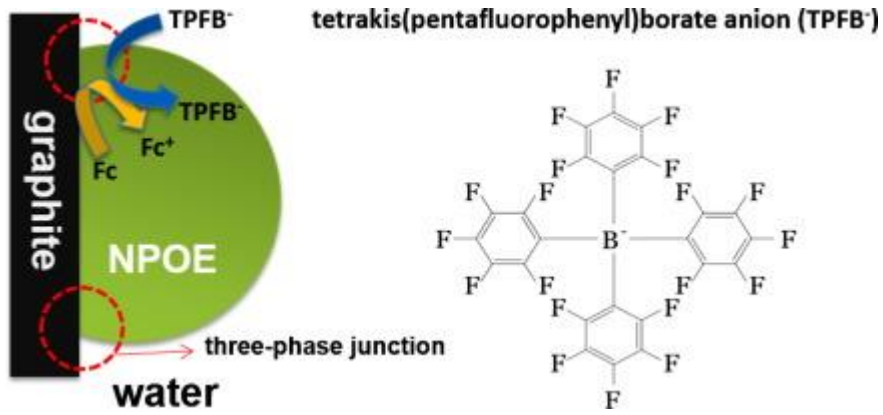
Scheme: Three phase electrode with TCNQ redox probe.

**Voltammetry of ion transfer,
or voltammetry of COUPLED ELECTRON-ION transfer**



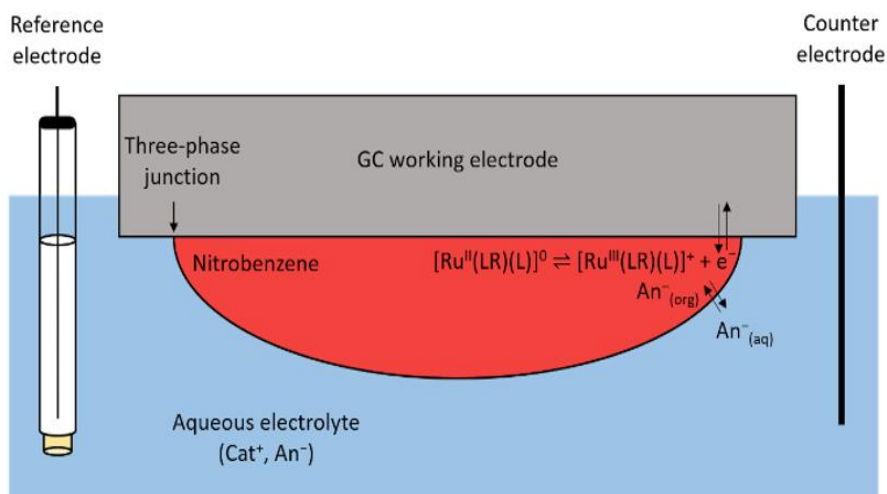
Transfer of Ionized Drugs-
heroin, cocaine and codeine
across biomimetic membranes





Miniaturized system of three-phase electrode

Recent redox probes suitable to transfer of hydrophilic anions



Scheme 3. Schematic representation of the ion transfer process at the three-phase junction created by NB droplet having $[\text{Ru}^{\text{II}}(\text{LR})(\text{L})]^0$ complex dissolved in it, attached on a GC electrode and immersed in aqueous electrolyte.

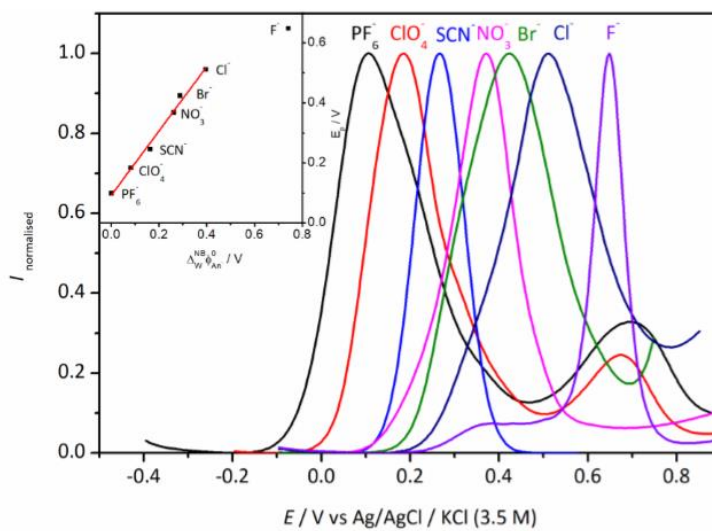


Figure 3. Square wave voltammograms of 10 mM $[\text{Ru}^{\text{II}}(\text{LR})(\text{L})]^0$ complex dissolved in a NB droplet

LITERATURE

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