MEASUREMENT OF INTERFACIAL TENSION BY LOCATING AN AIR BUBBLE ON THE OIL|WATER INTERFACE

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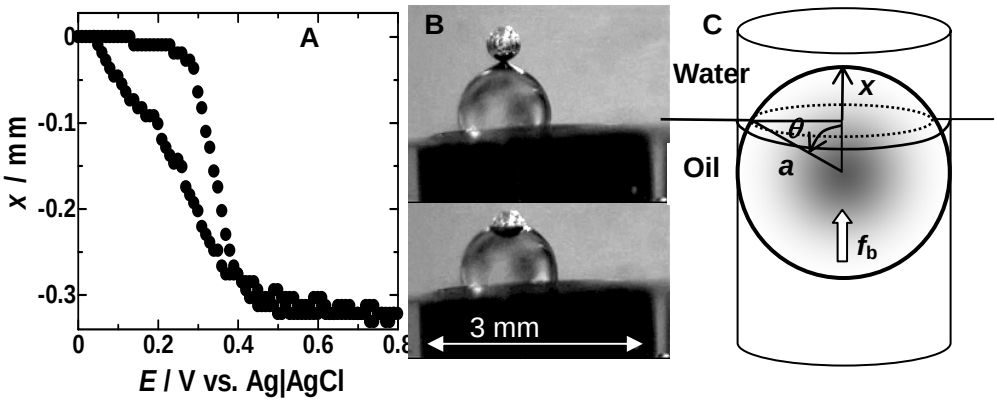
Introduction

When a sensor electrode is inserted in living tissues, piercing oil|water interfaces, the three-phase boundary should be formed. The electrochemical reaction at a three-phase boundary is a reaction at a line crossing a liquid|liquid interface with an electrode [1,2]. It occurs ordinarily on the electrode surface which adsorbed organic compound, modified electrode with a defective film. A reaction at the three phase boundary varies not only the charge balance, mass transport but also the interfacial energy.

Result and Discussion

An air bubble was injected to the boundary between a hemispherical nitrobenzene droplet and water phase. The oil contained ferrocene without salt, whereas the aqueous phase did only salt. The potential was applied between the aqueous and the oil phase. The bubble moved with the oxidation of Fc (Fig.B). The moving distance, *x*, between the top of the bubble and the water|oil interface was evaluated at potentials, showing hysteresis (Fig.A). The buoyancy of the bubble is balance with the summation of the surface tensions at oil|water, water|air and air|oil, as illustrated in Fig.C. The motion of the bubble was ascribed not only to the interfacial energy but also to charge balance, and mass transport [2].



A. Variation of distance, *x*, with applying potential.
B. The photo of an air bubble on the top of the oil droplet on the GC electrode immersed in the aqueous solution.
C. Illustration of the spherical air bubble retained between the oil phase and the water phase.

Reference

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