

Electrochemical behaviour of Prussian Blue at Nafion coated electrode

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Research on chemically modified electrodes is attracting more attention because of their successful application in electrosynthesis and electrocatalysis. Considerable interest has also been taken to study the electrodes modified with polynuclear metal complexes such as Prussian Blue (PB) for a variety of applications including electrochromism and battery electrodes. PB($\text{Fe}^{\text{II}}/\text{III}$) is oxidised and reduced reversibly to give Berlin Brown (BB, $\text{Fe}^{\text{III}}/\text{III}$) and Prussian white (Pw, $\text{Fe}^{\text{II}}/\text{II}$), respectively. Also a few reports have been published on the electrochemistry of bilayer coated electrodes using PB. In the present study, the electrochemical behaviour of PB was studied at different conditions. The cyclic voltammogram recorded for PB coated platinum electrode in the presence of 0.01 M HCl shows an additional redox wave at 0.35 V vs SCE in addition to the usual two redox waves. The same electrode shows only the usual two redox waves in the presence of 0.01 M KCl. Interestingly, the PB adsorbed into Nafion film shows three redox waves even in the presence of 0.01 M KCl. The new redox wave at 0.35 V is assigned to $\text{PB}'(\text{Fe}^{\text{III}}/\text{II})$ which is stabilised by the presence of acidic environment. In the case of Nafion coated electrode, the strong acidic environment imposed by Nafion membrane stabilizes the PB' .

References

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