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ELECTROCHEMICAL CHARACTERISTICS OF Bi(111) ELECTRODE IN IONIC LIQUIDS

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The cyclic voltammetry and the electrochemical impedance methods have been used to study the electrical double layer structure at Bi(111) | 1-ethyl-3-methylimidazolium tetrafluoroborate (EMImBF₄) [1] and Bi(111) | 1-ethyl-3-methylimidazoliumthiocyanate (EMImSCN) interface. The recent research activity of room temperature ionic liquids (RTIL) and their faradic electrochemistry, partly spurred by their potential applications in various modern electrochemical systems, including electrical double layer capacitors, aroused interest in the interface structure between ionic liquids and metal as well as carbon electrodes.

Bi(111) single crystal electrode is ideally polarizable in potential range from -1.1 V to -0.1 V vs. Ag | AgCl (EMImBF₄) (Fig. 1a) and from -0.75 V to 0.15 V vs. Ag | AgCl (EMImSCN) (Fig. 1b). Experimental complex impedance plane plots and total impedance and phase angle vs. frequency dependences at various electrode potentials were fitted using several equivalent circuits. Good results of fitting were obtained with the Frumkin – Melik-Gaikazyan equivalent circuit.

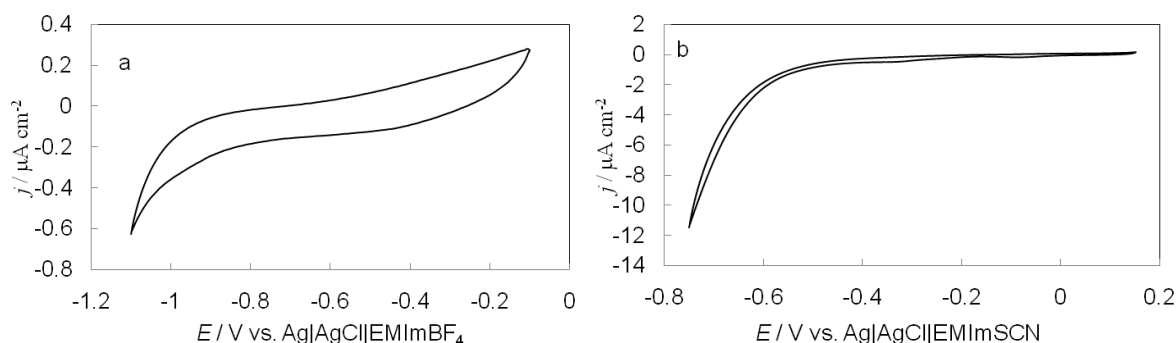


Fig.1. Cyclic voltammograms at potential scan rate 10 mV/s measured in EMImBF₄ (a) and EMImSCN (b).

References

1. L. Siinor, K. Lust and E. Lust, ECS Trans. **16** (49), 559 (2009)