Multistep electroreductions of C\textsubscript{60} in the ionic liquid containing film deposited on the electrode surface

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Room temperature ionic liquids are becoming attractive component of electrochemical systems \cite{1,2} including liquid modified electrodes. These already become important tool to study ion transfer processes across liquid|liquid interface driven by electrochemical generation of charge in one phase \cite{3}.

In earlier studies we have shown that C\textsubscript{60} dissolved in 1,2-dichlorobenzene film covering carbon electrode immersed in aqueous electrolyte solution exhibits voltammetry typical for three consecutive reversible electroreduction steps \cite{4,5}. The position of voltammetric peaks depends on the type of the electrolyte present in both organic and aqueous phases and were interpreted in terms of ion transfer across liquid|liquid interface \cite{4,5}.

Here these studies were extended to glassy carbon electrodes covered with film of C\textsubscript{60} solution in 1,2-dichlorobenzene supported with ionic liquids: phosphonium-phosphate ionic liquid \cite{6}, (C\textsubscript{4}mim)(NTf\textsubscript{2}) and (C\textsubscript{10}mim)(NTf\textsubscript{2}).

For these systems four subsequent fullerene electroreduction steps are seen (see figure on the right). The significant effect of the aqueous cations and anions on the subsequent C\textsubscript{60} reduction-oxidation potentials is analyzed in terms of ion transfer reactions following electron transfer steps. Due to insolubility of fullerene in ionic liquids similar studies were performed with glassy carbon electrode covered by solid C\textsubscript{60} film and ionic liquid film \cite{7}. For both systems the direction of ion transfer depends on the type of ionic liquid.

References:
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