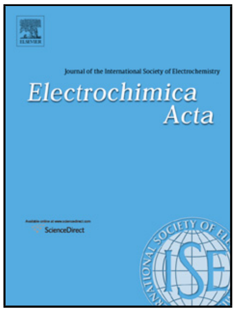

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The first representative of a new family of the bridgehead-modified difluoromethylenated homofullerenes: electrochemical properties and synthetic availability

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Abstract

The redox properties of the first member of a new family of bridgehead-modified difluoromethylenated homofullerenes, [6,6]-open $C_{60}(CF_2)H_2$, were investigated by means of cyclic voltammetry and ESR spectroelectrochemistry. The half-life time of $C_{60}(CF_2)H_2^{-\bullet}$ estimated from the decay of the ESR response exceeds 25.5 min at room temperature which will be crucial for practical applications later on. The high stability of $C_{60}(CF_2)H_2^{-\bullet}$ was proven to be attributed to spin density delocalization over the fullerene cage as well as to the higher BDE(C–H) value for $C_{60}(CF_2)H_2$ (as compared to $C_{60}H_2$). Di- and trianions of $C_{60}(CF_2)H_2$ are less stable and undergo partial dehydrogenation. A detailed voltammetric investigation of H-transfer processes (induced by radicals, radical-anion species or by a Brønsted bases) in the anionic

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