

Synthesis and Electrolytic Polymerization of a Fullerene-Terthiophene Dyad

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The synthesis of polymers containing fullerene sub-units in either the main or side chains are of great interest because they are expected to show characteristic electrical or optoelectronic properties.¹ Here we report the synthesis of terthiophene dyad having a C₆₀ cage connected by a triple bond **1**, utilizing a nucleophilic addition of lithium acetylide to C₆₀.² Lithium terthienylacetylide, which had been generated from the corresponding acetylene,³ was added to C₆₀ in *o*-dichlorobenzene followed by the treatment with methyl iodide to give fullerene-terthiophene dyad **1** in 35% isolated yield. The product **1** was characterized as an adduct with C_s symmetry by ¹³C NMR spectroscopy. The redox property of the dyad was studied by cyclic voltammetry. In the cathodic region, three reversible waves were observed corresponding to the reduction of the C₆₀ moiety, whereas electrolytic polymerization of terthiophene moiety was observed upon the repetitive anodic scans as shown in Figure 1. A yellow polymeric material, which is considered as a polythiophene having fullerene cages, was deposited on an ITO electrode after electrolysis. The electrochromism and electric properties of this polymer will be reported in detail.

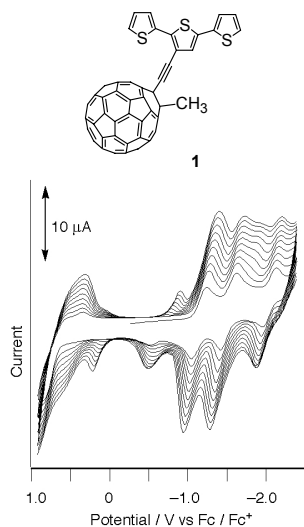


Figure 1. Repetitive Cyclic Voltammogram of **1**
(in ODCB, 0.1 M TBABF₄, scan rate 0.1 V s⁻¹).

References

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