Short Communication

Electrochemical Studies of Three Disamarium Large Metallofullerenes $\text{Sm}_2@D_2(35)\text{-C}_{88}$, $\text{Sm}_2@C_1(21)\text{-C}_{92}$ and $\text{Sm}_2@D_{3d}(822)\text{-C}_{104}$

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We isolated and purified three disamarium metallofullerenes of known structure, $\text{Sm}_2@D_2(35)\text{-C}_{88}$, $\text{Sm}_2@C_1(21)\text{-C}_{92}$ and $\text{Sm}_2@D_{3d}(822)\text{-C}_{104}$, by the reported method. Importantly, we characterized these three di-samarium metallofullerenes by cyclic voltammetry and differential pulse voltammetry, which is the first report of electrochemical studies of di-metallofullerenes containing divalent metal atoms. Their oxidation reactions are observed at a maximum positive potential compared with other endohedral metallofullerenes (EMFs), which, other than those of mono-samarium metallofullerenes, have never been reported. The electrochemical studies of these three compounds show much weaker electron-donating capacity and stronger electron-accepting capacity compared with the corresponding Sm-EMFs, fullerenes, or cluster-metallofullerenes. Interestingly, further analysis shows that normal-metallofullerenes present narrower electrochemical potential gaps than cluster-metallofullerenes, which might be attributed to their stronger interaction between the inner metal ions and the carbon cage.

Keywords: endohedral metallofullerene, di-samarium, electrochemistry, cyclic voltammetry (CV), differential pulse voltammetry (DPV)

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