Electrochemical studies of $C_{60}(CF_2)H_2$

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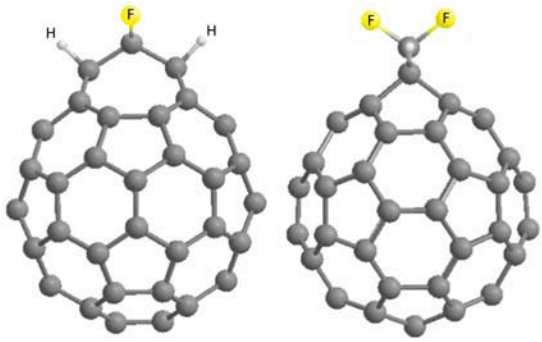
Fullerenes are known as *n*-type semiconductors and have clearly defined electron-acceptor properties. These properties are used to create new materials for photovoltaic purposes. Searching of new donor-acceptor pairs is one of the ways to improve the performance of organic solar cells. Functionalization of fullerene cage using electron-acceptor addends (e.g. difluoromethylene and thrifluoromethyl groups) usually increases the electron affinity, which is depends on number of addends and its arrangement motif [1].

Electrochemical behavior of the recently synthesized $C_{60}CF_2H_2$ [2] was studied using of cyclic voltamperometry. Two irreversible peaks of $C_{60}(CF_2)H_2$ reduction are observed at the potentials of -0.5 and -0.8 V *vs* Ag/AgCl. Partial dehydrogenation of $C_{60}(CF_2)H_2$ during electrochemical reduction was observed; new reduction couples corresponding to $C_{60}CF_2^{n-/(n+1)-}$ were registered. Compound under the study demonstrates unusual electrochemical behavior depending on scanning range of potentials. The model of electrochemical processes including electrocatalytic step, based on the temperature, scan rate and concentration dependences of I_a/I_c for first and second reduction potentials was suggested.



Two projections of $C_{60}(CF_2)H_2$.

[1] Popov A.A., Kareev I.E., Shustova N.B., Stukalin E.B., Lebedkin S.F., Seppelt K., Strauss S.H., Boltalina O.V., Dunsch L., *J. Am. Chem. Soc.* **129,** 11551 (2007).

[2] Goryunkov A.A., Kornienko E.S., Magdesieva T.V., Kozlov A.A., Vorobiev V.A., Avdoshenko S.M., Ioffe I.N., Nikitin O.M., Markov V.Y., Khavrel P.A., Vorobiev A.K., Sidorov L.N., *Dalton Trans.* 6886 (2008).