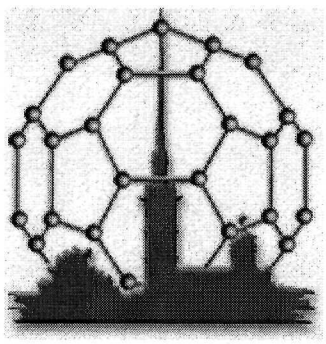
9th Biennial International Workshop

Fullerenes and Atomic Clusters IWFAC'2009



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  3. Synthesis and Properties of Carbon Onions and Nanodiamonds
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Invited Lectures

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The FT-IR spectroscopic studies of the destruction of the fullerites C_{60} and C_{70} under heating in the air

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In the present work the behavior of the powders of the fullerenes C_{60}, C_{70} and their solvate forms under heating in the temperature range from 200 to 400°C in the air have been studied by the FT-IR spectroscopy.

It has been shown that fullerene C_{60} under heating forms the oxides with single C-O bonds and then subsequent heating results in the destruction of the carbon cage, with forming double C=O bonds on the ends of C-C loose bonds. In under the same conditions, the destruction of the C_{70} molecule occurs with the oxidation along double bonds without intermediate formation of the oxides and dimers.

It has been revealed that oxidation of the solvate form of the C_{60} (crystallization from the toluene solution at room temperature) begins at lower temperature than that of the "non-solvate" form (crystallization in a rotating evaporator at 96°C, $P=10^{-1}$-10^{-2}Torr). In the latter case toluene "seals" between the microcrystals of fullerite without forming crystal solvates.

It have been established that a solvent evacuates from the crystalline lattice of the fullerene's solvate forms (both C_{60} and C_{70}) at the lower temperature than without any solvate.

The work was supported by the fundamental research program of Presidium of the Russian Academy of Sciences "Physical-chemical features of nanocarbon structures and metal-carbon nanocomposite obtained by mechanosynthesis".