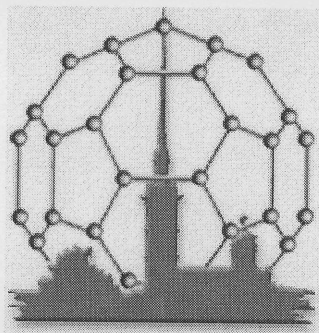


9th Biennial International Workshop

# Fullerenes and Atomic Clusters IWFAC'2009



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## Abstracts

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### Invited Lectures

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## Thermal behavior of $C_{60}$ and $C_{70}$ fullerenes in various environments

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The unique properties of the fullerenes have lead to intensive studies of the fullerene containing materials. The development of the techniques of their obtaining is considerably conditioned by the stability of the fullerenes' molecules and their crystalline phase – fullerites. However, the data of their thermal stability available in the literature are quite contradictory and ambiguous both for pure  $C_{60}$ ,  $C_{70}$  and their mixture.

The thermal stability studies of the fullerenes/fullerites were carried out using the powders of  $C_{60}$  (99.5%) and  $C_{70}$  (>98%) previously tableted under  $P=800$  MPa and then the tablets were annealed over the temperature range from 500 to 1050°C during 30 minutes both in CO (closed graphite crucibles) and in vacuum (quartz ampoules,  $P \sim 10$  Torr).

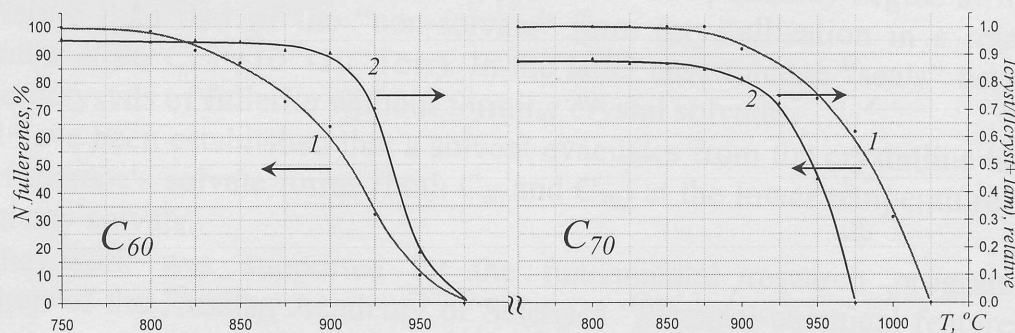


Fig. Thermal stability of fullerenes (1)/fullerites (2)  $C_{60}$  and  $C_{70}$

It has been established by the methods of X-ray diffraction and UV-vis spectroscopy that thermal stability of both the fullerene and fullerite  $C_{70}$  is higher than that of  $C_{60}$  (Fig.). It has also been shown that the thermal behavior of the fullerenes/fullerites is significantly affected by heating environment and by the presence of solvent residues. The thermal stability of the fullerenes by CO heating is considerably higher than that in the vacuum. It has been established that recrystallization from the toluene solution of  $C_{60}$  and  $C_{70}$  results in a substantial decrease of their stability after annealing in CO. The recrystallization of  $C_{70}$  from the gaseous phase (sublimation), which involves removal of both the oxygen residues and the trace of the solvent, leads to a considerably increase of their thermal stability.

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".