

Concentrating of higher metallofullerene and empty fullerene fraction with carbon cages of more than 100 carbon atoms

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The metallofullerenes and empty fullerenes form great families of homologues with increasing number of carbon atoms in a molecule up to formation of carbon nanotubes.

The most abundant in arc-produced carbon soot is metallofullerene $M@C_{82}$. Nevertheless main part of carbon-encapsulated metal atoms is located in high molecular weight fullerenes. For some applications, such, for instance, as MRI –contrasting, any metallofullerenes of $Gd@C_{2n}$ or their mixtures are suitable.

Here we report on the simple method of concentrating of higher homologues of metallofullerenes $Gd@C_{2n}$, based on the difference in solubility of metallofullerenes and empty fullerenes in special organic solvents. The usual procedure for preparation of $M@C_{82}$ is two stage extraction. The first stage is extraction from soot with o-xylene (or CS_2) of main part of empty fullerenes (C_{60}, C_{70} et al.) followed by second stage of extraction of metallofullerenes with DMFA(dimethylformamide). DMFA-extract contains main part of metallofullerenes but only $M@C_{82}$ can be easily redissolved in o-xylene. Therefore combining o-xylene and water for extraction of DMFA one can obtain solution of $M@C_{82}$ in o-xylene and the solid residue of higher metallofullerenes and empty fullerenes.

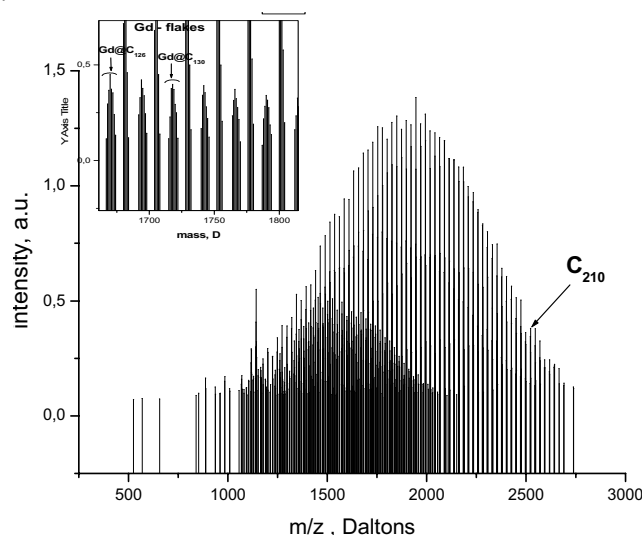


Figure. LD-TOF mass-spectrum of higher fullerene concentrate.

“Black” area is the Gd-metallofullerene region. It constitutes ~30% of residue.