In situ Mass Spectrometry Study of Chemistry of Fullerenes

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We shall present an overview of our recent studies of chemical reactivity of fullerenes and some derivatives.

The method of Knudsen cell mass spectrometry has been used by our MSU group primarily for the studies of thermodynamic properties of fullerenes and their charged counterparts, this work has resulted in numerous thermochemical data for the gas-phase fullerene species.

In parallel, we have been developing new methods of fluorination of fullerenes, based on the use of transition metal fluorides. In this report, our initial works on in situ fluorinations, in which first observations of $C_{60}F_{18}$, $C_{60}F_{36}$,[1,2,3] $C_{60}F_{20}$,[4] were made, will be reviewed, and methodological aspects of the technique will be discussed.

More recent fluorination works involved new classes of fullerene compounds, such as bis-azafullerenes, higher fullerenes, endohedral compounds. These experiments revealed significant differences in reactivity of various fullerene cages. We shall report on the new fluorinated compounds observed in the in situ experiments and propose their structures. The same experimental approach was applied for the studies of other than fluorinations, reactions of fullerenes which yield thermally stable derivatives.

References

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