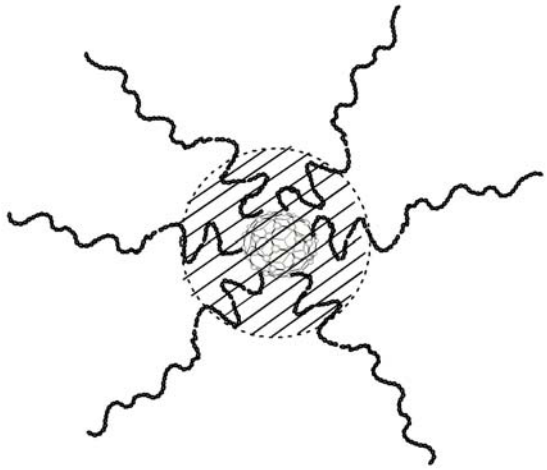
Specific internal structure of star-shaped polystyrenes with fullerene C_{60} branching center

Lebedev V.T. [*1], Török Gy.[2], Ratnikova O.V.[3],Vinogradova L.V.[3]

[1]*Petersburg Nuclear Physics Institute, Gatchina, Saint-Petersburg distr., Russia*
[2]*Research Institute for Solid State Physics and Optics, Budapest, POB-49, Hungary*
[3]*Institute of Macromolecular Compounds RAS, Saint-Petersburg, Bolshoi pr. 31, Russia*
**e-mail: vlebedev@pnpi.spb.ru*

Using the techniques of molecular correlation functions and various models for the analysis of small-angle neutron scattering data concerning structure and conformational characteristics of fullerene-containing regular star polystyrenes (Debye and Benoit approximation and Fourier transform of scattering cross-sections), a number of peculiarities of star structure in deuterated toluene solution was revealed. It was found that the polymer core around fullerene C_{60} molecule is formed in the center, and therefore this center is being impenetrable for other macromolecules. Moreover, a stretched conformation of polymer arms is more stable as compared with that of free polystyrene chains due to increase in local rigidity of arms taking place under the action of fullerene center. It was shown that the formation of polymer shell around fullerene branching center and the peculiar conformation of arms result from the competition between two opposite tendencies of PS arms' behavior. One of chain ends covalently bound to fullerene shields its surface from solvent, while the outer end tends to active interaction with thermodynamically good solvent. The specific action of fullerene center on arms' conformation leading to decrease in their statistical flexibility results in the increasing star dimensions by approximately 30% as compared to stretching effect according to *Daoud-Cotton model.*



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