

Use of Small-angle Neutron Scattering in Study of Nanocarbon and its Liquid Dispersions

M.V. Avdeev¹ and V.L.Aksenov^{2,1}

¹*Joint Institute for Nuclear Research, Dubna Moscow Reg. Russia*

²*Russian Research Center Kurchatov Institute, Moscow, Russia*

Applications of small-angle neutron scattering (SANS) for studying microstructural features in a number of nanocarbon systems are reviewed. They include structural investigations of shungites-natural form of carbon- and nanodiamond powders. Analysis of the complex pore size distribution function and fractal characteristics of the pore structures in these systems is given. Changes of these characteristics in different conditions are followed. Also, it is shown that the method can be effectively used in the study of liquid dispersions of different forms of nanocarbon including colloidal fullerene water solutions (FWS), shungite aqueous dispersions, and dispersions of detonation ultrananocrystalline diamond in different liquids. The structure of colloidal particles in the dispersions, as well as interparticle interaction are analyzed by SANS experiments. The use of isotopic substitution hydrogen/deuterium in liquid carriers of the dispersions constitutes the basis of the contrast variation method in SANS due to a large difference in the scattering properties of the two isotopes. It makes it possible to conclude about quantitative characteristics of the atomic distribution density inside the dispersed nanocarbon particles. The work was supported by the ISTC, project 2769.