

**SMALL ANGLE X-RAY SCATTERING IN SULFUR-IMPREGNATED
BULK NANOCLUSTER CARBON PRODUCED FROM SILICON
CARBIDE**

E.A. Smorgonskaya, R.N. Kyutt, A.M. Danishevskii

Ioffe Physico-Technical Institute RAS, St.-Petersburg, Russia

S.K. Gordeev and A.V. Grechinskaya

Central Scientific Research Institute of Materials, St.-Petersburg, Russia

Bulk nanocluster carbons (NCC) produced by selective etching of carbides in chlorine show a high degree of porosity (65–70 vol%) and nanoporosity (~45 vol%) and thus offer promise for the host–guest technology of new carbon-based nanocomposites. Besides, filling of pores with certain guests provides a means for studying the intrinsic porous structure of the NCC hosts.

The size distribution and parameters of nano-scale inhomogeneities in NCC were deduced recently from small-angle X-ray scattering (SAXS). However, no unambiguous conclusion could be reached on whether or not the SAXS characteristics were related to nanopores or constituent carbon nanoclusters. Now this problem is clarified via the SAXS measurements on a sulfur-impregnated NCC-based nanocomposite prepared from polycrystalline α -SiC. Sulfur was introduced from its boiling solution in toluene. The filling factor was τ 70 vol%. The SAXS intensity was recorded before and after impregnation. The related “differential” SAXS curve was constructed and then analyzed in the Guinier model. The special convenience of sulfur is that its electronic density in the solid state is close to that of the carbon skeleton, so that the filling of nanopores suppressed the net SAXS signal over a wide angle range. A variation in the shape of the SAXS curve on impregnation was revealed, suggesting a non-uniform filling of variously sized nanopores. The size distribution function of sulfur-filled nanopores was found. It is concluded that the earlier SAXS characterization of NCC hosts should be attributed to nanopores rather than to carbon nanoclusters.

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