Title: Microstructure of carbon black nanomaterials studied by X-ray scattering

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Abstract:

This thesis studies microstructure and real microstructure of turbostratic carbon and carbon nanotubes using x-ray scattering. Clusters of turbostratic carbon are described using several physical parameters. Influence of these parameters on scattering curve is described using computer simulations. Description of two different types of carbon nanotubes is given. Influence of type, length and width of carbon nanotube on scattering curve is presented.

For experimental part a series of samples of turbostratic carbon annealed at temperatures 300℃, 600℃, 800℃, 1000℃, 1200℃, 1400℃ a 1800℃ was prepared. Using small angle x-ray scattering (SAXS) dimensions, porosity, specific surface area and surface fractal dimension of samples were determined.

Other physical parameters such as size and size distribution of clusters La and Lc of turbostratic carbon, lattice parameters a and c and mean square displacement of atoms in direction of graphene layer and in direction perpendicular to graphene layer were determined from wide angle x-ray scattering measurements of these samples using procrystalline model of turbostratic carbon.

Keywords:

X-ray scattering, turbostratic carbon, carbon nanotubes, microstructure