

MORPHOLOGY OF GRAPHITE FIBERS - COEXISTENCE OF CRYSTALLINE GRAPHITE AND TURBOSTRATIC CARBON PHASES

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Abstract

Both a crystalline graphite and a turbostratic carbon phase have been detected in graphite yarns prepared from aromatic polyamide and acrylonitrile homo- and co-polymer fibers. The graphite phase is usually more highly oriented in the fiber axis direction and has interlayer spacings (c - axis) of 3.36 to 3.40 angstroms. Interlayer spacings for the carbon phase are 3.42 to 3.44 angstroms.

The average single fiber tensile strengths of these samples range from 21,000 to 260,000 psi, and Young's modulus is from 4.5 to 80 million psi. Comparisons were made between these materials, other specimens produced in this Laboratory in which separate phases were not detectable, and materials prepared by other laboratories. The structure of the carbon yarn appears to be highly dependent on the polymer precursor. It is shown that high modulus and high strength can be induced in carbons of differing structures.