A Study on the Surface and Electrical Properties of Copolymerized Aramid Fibers Deposited With Reduced Graphene Oxide

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Abstract

Copolymerized aramid fiber is a fiber obtained by copolymerizing meta-aramid and para-aramid, which consists of an aromatic polyamide in which an amide group whose main chain is -NHCO- is directly connected to an aromatic ring. Since, copolymerized aramid fibers have excellent mechanical and thermal properties, they are mainly applied in various industrial fields with enhanced processability and durability such as aircraft or ships, hulls, building materials, tires and helmets. In recent years, the application of high-strength and electrically conductive textile materials such as wearable devices and flexible electronic materials is highly demanded. However, copolymerized aramid fibers have few polar groups in the chain and have no electrical conductivity, so they have not been used for the electrically conductive materials.

In this study, graphene oxide was deposited on the surface of copolymerized aramid fibers using electrophoresis with the controlled electrophoretic process parameters such as voltage and time. It was attempted to improve electrical conductivity by reducing graphene oxide to graphene. Reduction of graphene oxide was proceeded by thermal reduction and chemical reduction method using ascorbic acid and hydroiodic acid on copolymerized aramid fibers coated with graphene oxide. Graphene-coated copolymerized aramid fibers were analyzed by FTIR, XPS, Raman, electrical conductivity measurement, and surface microstructure observation to examine the effect of graphene coating.

Keywords: Copolymerized aramid fiber, Graphene Oxide, Electrophoresis, Reduction, Electrical conductivity