

# **The effect of filler particle size on the antibacterial properties of compounded polymer/silver fibers**

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## **Abstract:**

Antibacterial activity has become a significant property of textiles used in applications such as medicine, clothing, and household products. In this study, we compounded polypropylene with either micro- or nano-sized silver powders.

These polypropylene/silver compounds were prepared by direct melt-compounding using a conventional twin-screw mixer. We analyzed the characteristics of the compounds using wide-angle X-ray diffractometry (WAXS), differential scanning calorimetry (DSC), and scanning electron microscopy (SEM). The DSC and WAXS results indicated that the crystallinity of the polypropylene component decreased slightly when compared with that of the pure polymer.

The SEM micrographs indicated that the silver particles had good dispersibility in the matrix. We measured the mechanical properties of these materials using a universal tensile tester and evaluated the antibacterial activities of these compounds by performing quantitative antibacterial tests using the AATCC-100 test method.

From these evaluations of antibacterial activity, we conclude that the compounds incorporating the silver nanoparticles exhibited superior antibacterial activity relative to the samples containing micron-sized particles.