

Manufacture of Tungsten Bronze Nanorods and Their Nanocomposites with Polyolefins and Rubbers

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Nanomaterials that can absorb near-infrared (NIR) light and efficiently emit heat, and their polymer nanocomposites with improved mechanical and photothermal properties are an ideal candidate material for cold-resistant applications such as gloves, sporting goods, outdoor clothing, footwear and military materials. As the photothermal nanomaterial, tungsten bronze nano-rods were synthesized via a hydrothermal decomposition of ammonium metatungstate in oleylamine. As-synthesized tungsten bronze nanorods exhibited high absorption in the NIR range and could be used as a photothermodulator for heat generation. Their nanocomposites were simply prepared by mixing an organic dispersion of the tungsten bronze nanorods with an organic solution of a rubber. Noticeably, they presented significantly, simultaneously enhanced tensile elongation and photothermal temperature.