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Perspective

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Physical and Chemical Properties of Textile Polymers

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Description

Stimuli-sensitive materials that are "smart" can be synthetic or natural. Many attempts have been made by scientists to develop smart textiles by copolymerizing Environment-Responsive Polymers (ERP) onto the surface of fabrics. Textile polymers are processed using various chemical and physical processes to change their original properties for a variety of applications. Cotton fiber, for example may have dual properties of hydrophobicity and hydrophilicity due to various processes. Furthermore, new polymer developments for potential textile applications (such as energy harvesting and storage) have recently received a lot of attention, which would aid in the exploration of new insights for the textile industry. Polymers are essential chemicals for the production of textiles. Natural polymers such as cellulose, keratin, and fibroin as well as synthetic polymers such as polyethylene, polypropylene, polystyrene, polyesters, polyamides, polyurethanes, polytetrafluoroethylene, polyvinyl chloride, and polyvinyl alcohol are used. A polymeric ultrafine particle material is a polymeric material or polymer composite material with particles that range in diameter from nanometers to micrometers and have a spherical shape or other geometry. Polymer particles are primarily used to treat the surfaces of coatings, paper, adhesives, plastic additives, and other materials.

An emulsion-solidification method, a complex coacervation method and the precipitation of a homogeneous polymer solution are used to prepare polymer microparticles using a polymer as the raw material. Technical textiles are used as components in almost all types of clothing, in addition to their use in personal protective equipment (including protective clothing) as mentioned above. Sewing threads, wadding, linings, and thermal insulation materials are examples of these applications. The most important application of technical textiles in clothing however is as the primary material of construction for a wide range of performance apparel for sports activities. Technical textiles are used in the home for a variety of purposes, including hollow thermally insulating fibers incorporated into bedding and sleeping bags, soundproofing curtains, and darkening curtains. Customers interested in soundproofing and/or darkening performance from their curtains prefer such curtains for their technical properties over curtains with comparable aesthetic or decorative characteristics in the examples involving curtains. Plasma-induced polymerization of modified pyrrole monomers results in hydrophobic and oleophobic coatings on nylon and cotton textiles. For improved mechanical adherence, this process forms a chemical bond between the polymer and the textile fibers. Temperature-sensitive hydrogels have received a lot of attention in the pharmaceutical industry because of their ability to swell or shrink as the temperature of the surrounding fluid changes. Numerous variety of applications for these hydrogels, including on-off drug release controls, biosensors, and intelligent cell culture dishes.

Positive or negative temperature-sensitive systems are thermo sensitive hydrogels. A positive temperature-sensitive hydrogel's Upper Critical Solution Temperature (UCST). When cooled below the UCST, such hydrogels contract. The critical solution temperature of negative temperature-sensitive hydrogels is lower. When heated above the LCST, these hydrogels contract. Smart polymers have the ability to respond to external stimuli and have a wide range of potential applications. Based on smart polymer modification, environmentally responsive fabrics can be tailored to respond to a variety of stimuli, such as temperature, pH, and so on. Because of the aforementioned characteristics, smart textiles can keep us warm in cold weather or cool in hot weather, protect us from bacterial attack.