عنوان مقاله:

Ultra-high molecular weight polypropylene (UHMWPP) : Synthesis and fiber processing

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خلاصه مقاله:

Ultra-high molecular weight polyolefin (UHMWPO) has enormous potential applications due to their excellent mechanical properties such as tensile strength, flexural modulus, toughness and outstanding chemical resistance. But the processing of polyolefin, in particular, UHMWPO fibers cannot be processed by conventional methods due to its very high melt viscosity. In this work, we synthesized isotactic ultra-high molecular weight polypropylene (UHMWPP) resin and studied the processability of UHMWPP fibers using gel spinning and investigated physicomechanical properties. UHMWPP gel was made at various concentrations in decalin solvent at ۱۵۰ ℃ to produce consistent spinning dope solutions. The ۷ wt.% concentration of UHMWPP was deemed best for fiber creation, compared to ۳ wt.% and ۵ wt.%. A rheological time sweep was done to ensure the gel's stability at ۱۷۰ ℃ before the spinning process. The UHMWPP's gelation and fiber formation were studied by tweaking the gel concentration and adjusting the processing temperature. The resulting UHMWPP monofilament had a measure of ۲۲۰-۲۵۰ denier. The hot stretched fibers were analyzed with the scanning electron microscope (SEM) to understand the surface morphology of the fibers. The crystal morphology of UHMWPP fibers was measured with wide-angle x-ray scattering (WAXS) and DSC. The X-ray measurement of hot stretched UHMWPP fibers showed crystalline peaks compared to those without stretched fibers.

کلمات کلیدی:

polyolefin, UHMWPP fibres, gel-spinning process, fiber stretching