

Effects of the Preparing Conditions on the Physical Properties of Surface Grown UHMW PE Fibers.

노 영욱, 김 상용
서울대학교 공과대학 섬유공학과

A study has been made on the fibrous crystallization process of ultra high molecular weight polyethylene from a dilute solution subjected to a shear flow, described as "Surface Growth". The factors affecting the physical properties has been investigated by changing the crystallization variables such as crystallization temperature, rotor speed, take-up speed, and polymer concentrations. The fiber obtained by this process at a temperature above the thermodynamic equilibrium temperature (118.6°C) gave a tensile modulus of 133 GPa and a breaking stress as high as 5.04 GPa at a breaking strain of 3.1 %.

The crystallization temperature turned out to be the most dominant factor affecting the physical properties. The change in polymer concentrations showed no enhancement in physical properties above 0.7 wt.%, arising from the increase in tension on the fiber. Below 0.5 wt.% it is clear that there is a decrease of the formation of the gel layer on the rotor surface, thus giving an optimum range in view of physical properties, ranging between 0.5 wt.% & 0.7 wt.%.