

Wet Spinning of Conventional and RAFT PAN Precursor for Carbon Fibre Manufacture

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Polyacrylonitrile (PAN) is widely used for the manufacture of high performance carbon fibres. The characteristics of the PAN polymer such as its molecular weight, polydispersity and comonomer composition influence the wet spinning and carbonization processes and ultimately the properties of the precursor and carbon fibre.

In this study, PAN polymers synthesized by conventional and reversible addition fragmentation chain-transfer (RAFT) polymerization techniques were compared. RAFT polymerization enables the production of polymer with reduced branching and low dispersity. Wet spinning conditions such as dope viscosity, coagulation bath properties, extrusion velocity, jet stretch and total stretch ratios were optimised for each polymer to maximize precursor strength, density and circularity. These precursor fibres were then carbonized under optimum conditions to produce carbon fibers. A comparative study of the fibre morphology, tensile properties, density and porosity of the precursor and carbon fibres produced from the different PAN polymers will be discussed.