

Hollow fiber spinning machine

Tailor made by: TCO University of Twente



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Introduction

The hollow fiber spinline is used to produce hollow fiber membranes via a dry-wet immersion precipitation phase separation process. The fibers are spun by co-extruding a polymer solution and an internal coagulant into a water containing coagulation bath.



The nascent fiber leaving the spinneret and the spinline.

Principle

The dry-wet spinning process consists of three stages of diffusion-induced phase separation:

1. Solvent evaporation or vapor penetration at the outer surface of the extruded polymer solution.
2. Immersion precipitation through the inside; non-solvent from the bore liquid diffuses into the polymer solution.
3. Immersion precipitation via the outer surface when the nascent fibers enters the coagulation bath

Characteristics

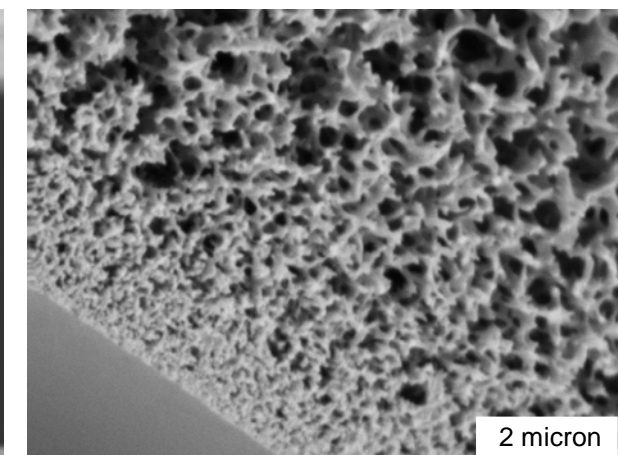
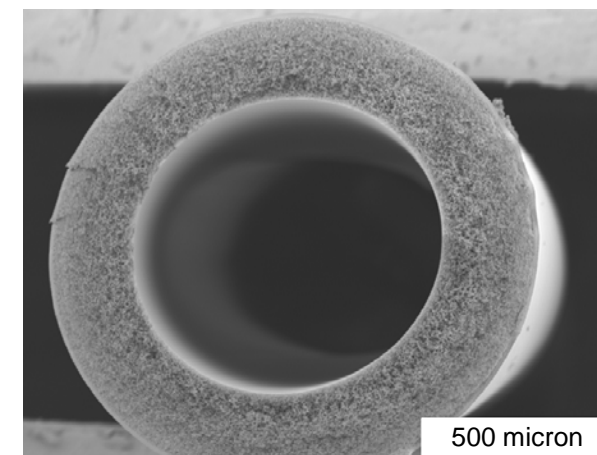
Dry-wet spinning of hollow fiber membranes has a number of advantages:

- membrane morphology is tailored by an appropriate formulation and spin parameters
- pore structure is formed both from outside and inside
- typical diameters: 200 - 5000 micrometer
- typical production speed: 5 - 50 m/min

Applications

The hollow fibers are applied in:

- waste water treatment and drinking water production
- wine and beer clarification
- gas separation e.g. O_2/N_2 and biogas upgrading
- (bio)medical e.g. hemodialysis, controlled release



SEM pictures of a hollow fiber membrane.