FIBER OF POLY(VINYL ALCOHOL) DERIVED FROM
VINYL TRIFLUOROACETATE

II. THE DIRECT WET-SPINNING OF POLY(VINYL ALCOHOL) FROM THE
AMMONOLYSIS SOLUTION OF POLY(VINYL TRIFLUOROACETATE)*1

By Kazuo Yamaura, Yoshinori Itoh and Shuji Matsuzawa

(Faculty of Textile Science and Technology, Shinshu University,
Tokida 3-15-1, Ueda, Nagano 386, Japan)

As poly(vinyl alcohol) (PVA_{VTFA}) derived from vinyl trifluoroacetate has higher syndiotacticity than PVA_{VAc} derived from vinyl acetate, the former scarcely dissolves in water at temperatures below 100°C.1,2) The spinning of PVA_{VAc} is generally carried out by using its aqueous solution, but not that of PVA_{VTFA}. Although PVA_{VTFA} is dissolved at temperatures above 120°C in a sealed tube in water,1,2) the solution gels easily at the room temperature,3) thus the solution is unsuitable for the spinning. Poly(vinyl trifluoroacetate) (PVTFA) is converted to PVA by dissolving in 2,2'-diaminodiethylamine4) and the ammonolysis solution obtained is transparent and homogeneous. This paper reports the direct wet-spinning of PVA_{VTFA} from the solution. The degree of polymerization and the content of syndiotactic diad of PVA_{VTFA} sample are 2850 and 54.2% respectively. Fig. 1 shows the diagram of the spinning apparatus. Methanol is used as coagulant and the spinning was carried out at room temperature (ca. 20°C). A glass nozzle of which the inner diameter was 0.25mm was used and the spinning pressure was about 1kg/cm². Table 1 shows two examples of the spinning conditions.

The thickness of the fiber obtained was not uniform. In the case of No. 1, the thickness was in the range 1.7×10⁴ nm to 3.2×10⁴ nm and the mean value was 2.62×10⁴ nm. The birefringences (dδn) of those fibers were in the range 0.01195 to 0.00332, that is, the finer the fiber, the higher the birefringence. When the fibers of No. 1 were elongated about 3.56 times of the original length at room temperature in air, three per 32 fibers has

![Diagram of spinning apparatus](image)

Fig. 1. The diagram of spinning apparatus.

*1 part 1: Colloid & Polymer Sci., 258, 131 (1980)
Table 1. The conditions of spinning and the properties of fibers obtained.

<table>
<thead>
<tr>
<th>No.</th>
<th>Concentration of PVA (g/dl)</th>
<th>Speed of 1st roller (m/min)</th>
<th>Speed of 3rd roller (m/min)</th>
<th>Volume of solution (ml)</th>
<th>Time of spinning (min)</th>
<th>Length of fiber (m)</th>
<th>Weight of fiber (gr)</th>
<th>Denier</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>3.29</td>
<td>1.12</td>
<td>5.98</td>
<td>5</td>
<td>59</td>
<td>566</td>
<td>0.1645</td>
<td>2.61</td>
</tr>
<tr>
<td>2</td>
<td>2.91</td>
<td></td>
<td></td>
<td></td>
<td>80</td>
<td>636</td>
<td>0.1454</td>
<td>2.06</td>
</tr>
</tbody>
</table>

broken. The elongated fibers resisted until 4.55gr per denier (mean \(dn=0.0304\)). The fibers of No. 1 were to be elongated until 6.35 times of the original length at 100°C in silicone oil without breaking. The elongated fibers resisted until 8.11gr per denier, that is, the strength was over 39kg/mm² (mean \(dn=0.0448\)).

References

2) T. Ito, K. Noma, I. Sakurada, Kobunshi Kagaku, 16, 115 (1959)
4) H. C. Haas, E. S. Emerson, N. W. Schuler, J. Polymer Sci., 22, 291 (1956)

トリプロロ酢酸ビニルから誘導したポリビニルアルコールの繊維
ポリトリプロロ酢酸ビニルのアンモノリシン溶液からのポリビニルアルコールの直接浸漬系紡糸

信州大学繊維学部　山浦和男、伊藤嘉教、松沢秀二

トリプロロ酢酸ビニルから誘導したポリトリプロロ酢酸ビニルのアンモノリシン溶液をメタノール中に出し、重合度2850、シングオタクトdiad含量542のポリビニルアルコールの繊維を直接浸漬式紡糸した。得られれた繊維をシリコンオイル中100°Cで延伸したものならびに空気中(20°C)で延伸したものとの繊維の強度はそれぞれ81gr/デニール、46gr/デニール以上であった。