

Characteristic and Performance of Elementary Hemp Fibre

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Main Objectives

- **To develop a methodology of isolating elementary fibre from fibre bundles**
- **To develop a methodology of characterizing elementary fibre**
- **To determine the surface and crystalline of hemp fibres**
- **To examine the failure mechanism of hemp fibres**
- **To examine the effect of processing parameters on the strength of fibres**

Results (from the Poster)



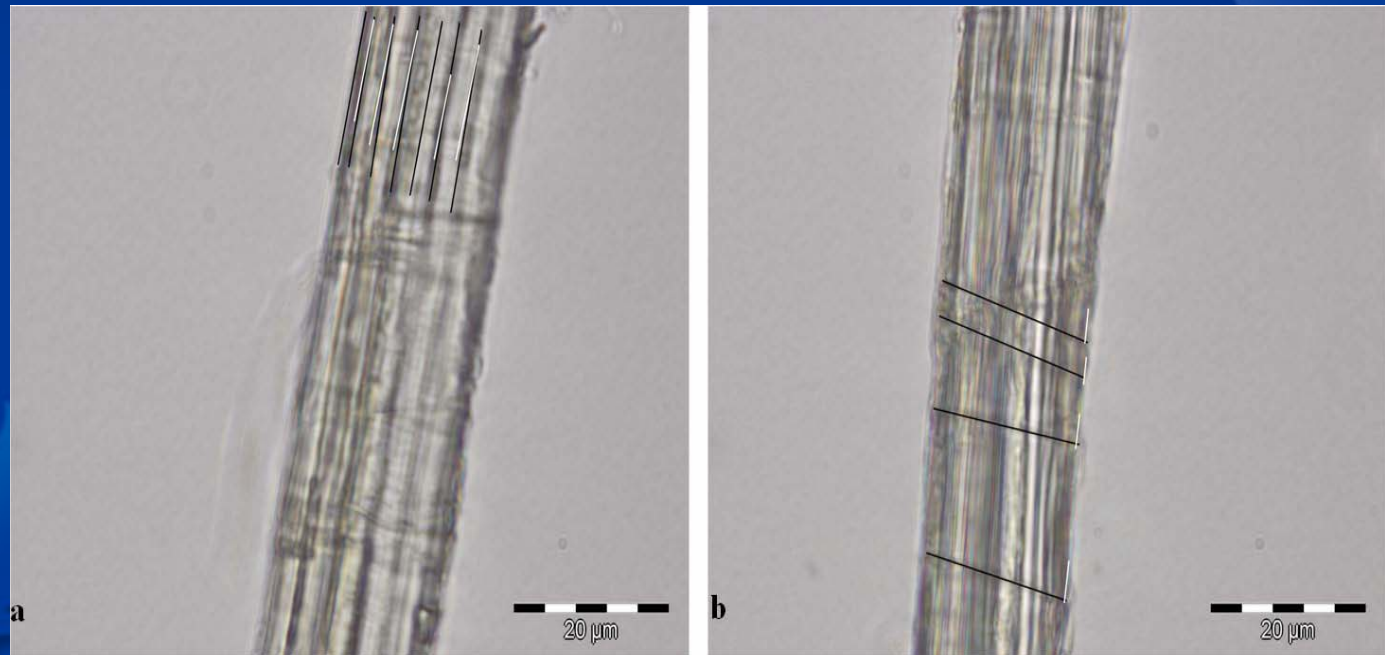
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➤ Microfibril angle of hemp fibres

Average:

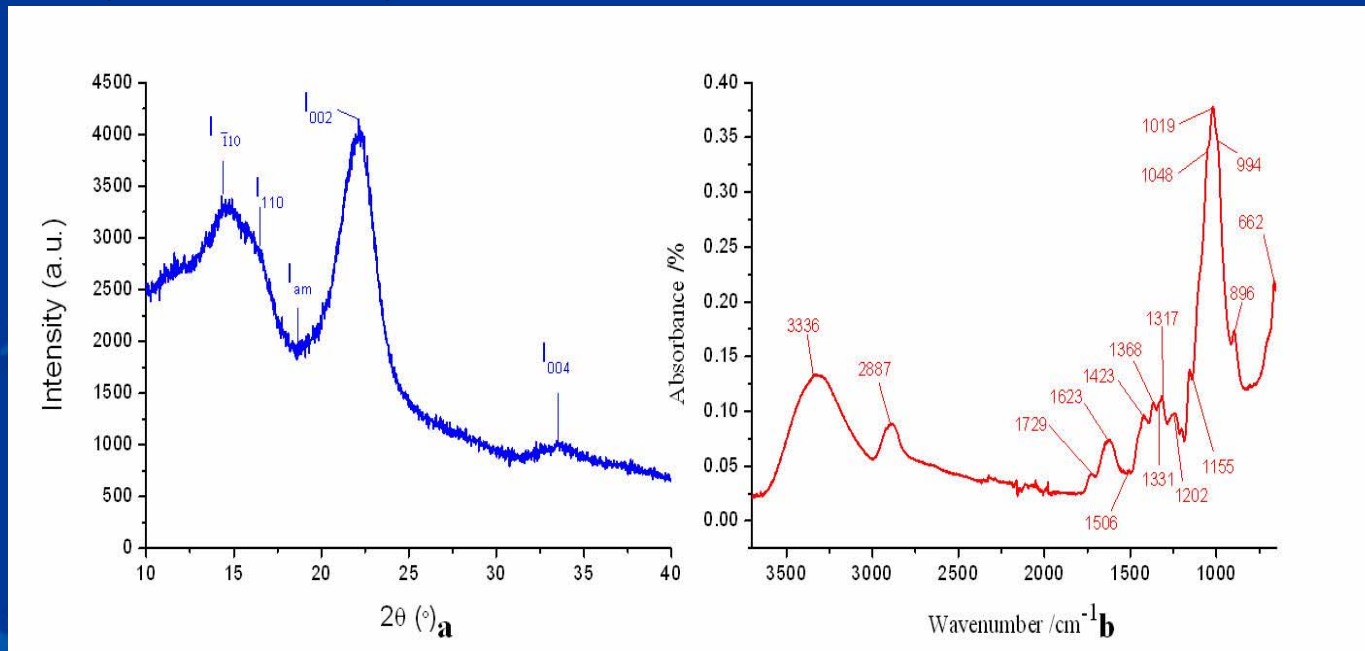
✓ S2: 2.7°

✓ S1: 80°



➤ XRD & FTIR of hemp fibre

- ✓ Major crystalline peak: $2\theta=22.1^\circ$
- ✓ Minimum intensity: between 002 and 110 peaks (I_{am}) at $2\theta=18.6^\circ$
- ✓ Crystallinity index: 56%.



➤ Deformation of hemp fibres

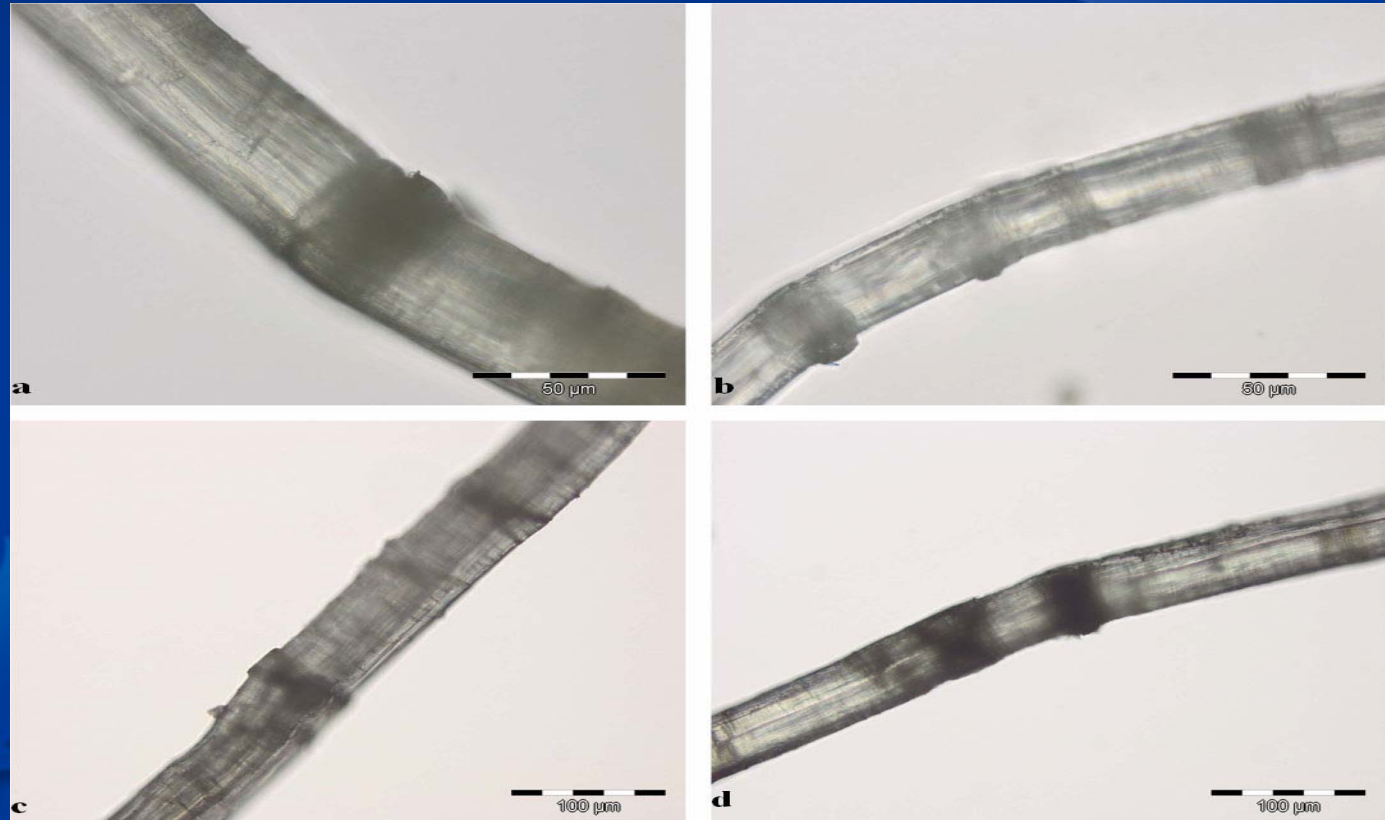
Four main types:

✓ Kink band

✓ Node

✓ Dislocation

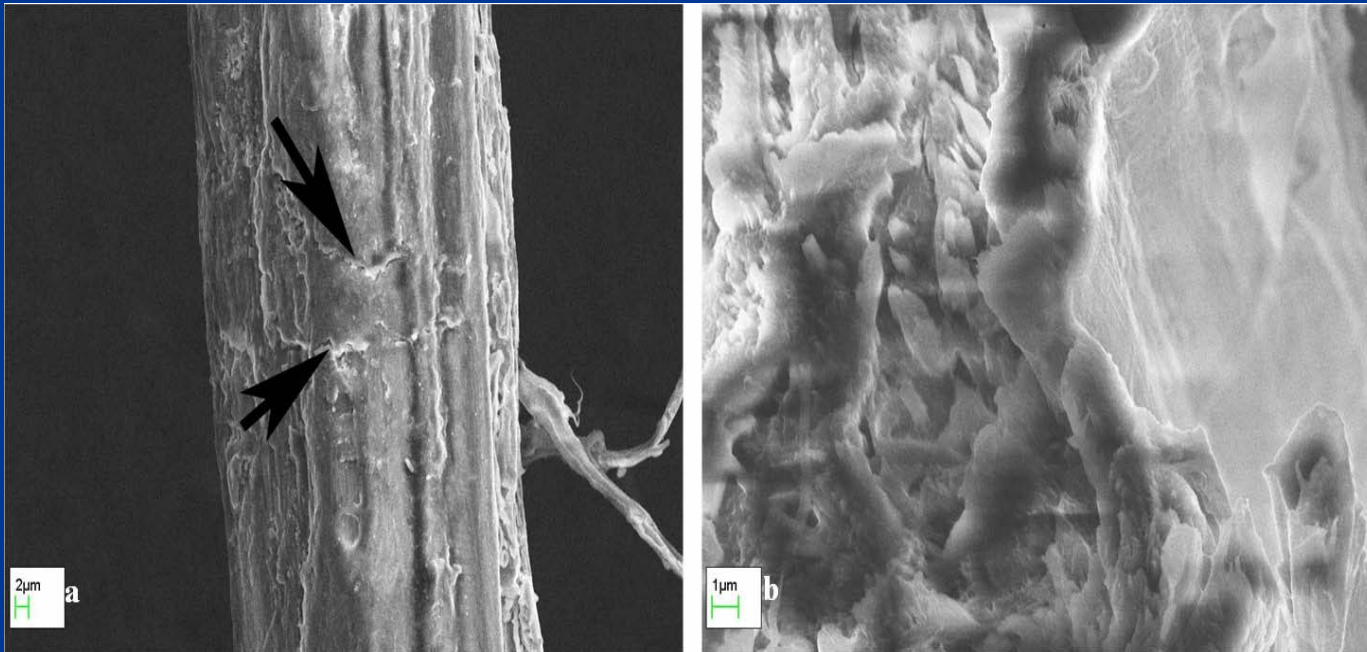
✓ Slip plane



➤ Breaking process of hemp fibre

✓ Primary wall = initial crack point

✓ Microfibril angle in the fracture region $>$ normal



Conclusions

- ❑ The average MFA of hemp fibre was about 80° in the S1 layer and 2.7° in the S2 layer. The crystallinity index of hemp fibre was 56%.
- ❑ The majority of the processed elementary hemp fibre appeared with one or more of the four main types of deformations identified in the study.
- ❑ Crack and fracture of hemp fibres were observed progressing in a certain order during breaking processes. The structure of the fracture region was different from those of other regions within a fibre.

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