Analyzing size, form and distribution of particles for WPC

Andreas Krause Marcus Müller, Kim Krause

Introduction

- Wood Polymer Composites (WPC)
  - Thermoplastic polymers as matrix (e.g. PP)
  - Wood particle as fiber (flour, fiber …)
  - Coupling agents (MAPP)

- Has wood a potential to reinforce thermoplastics?

Fiber Matrix Theory

Tensile strength: fiber > matrix ✓

Modulus of elasticity: fiber > matrix ✓

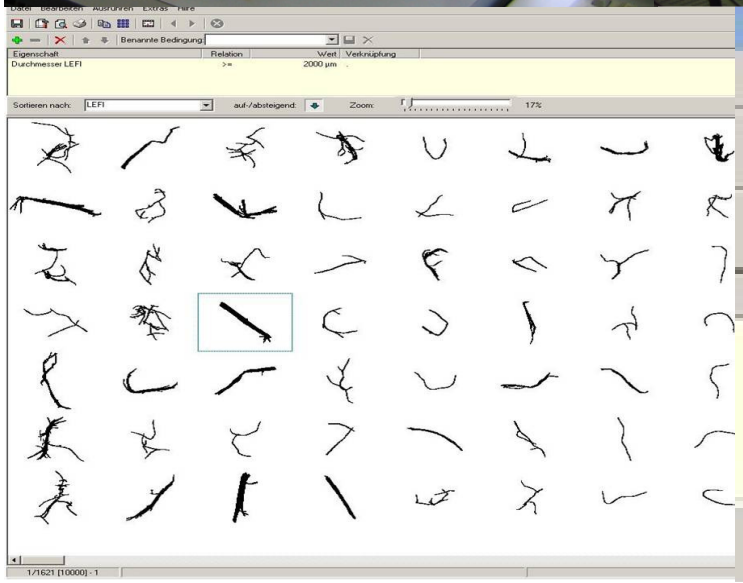
Elongation at break: fiber < matrix ✓

Crucial aspect ratio:

$$AR_c = \frac{l_c}{d_f} = \frac{\sigma_{fB}}{2 * \tau_B} = 10$$

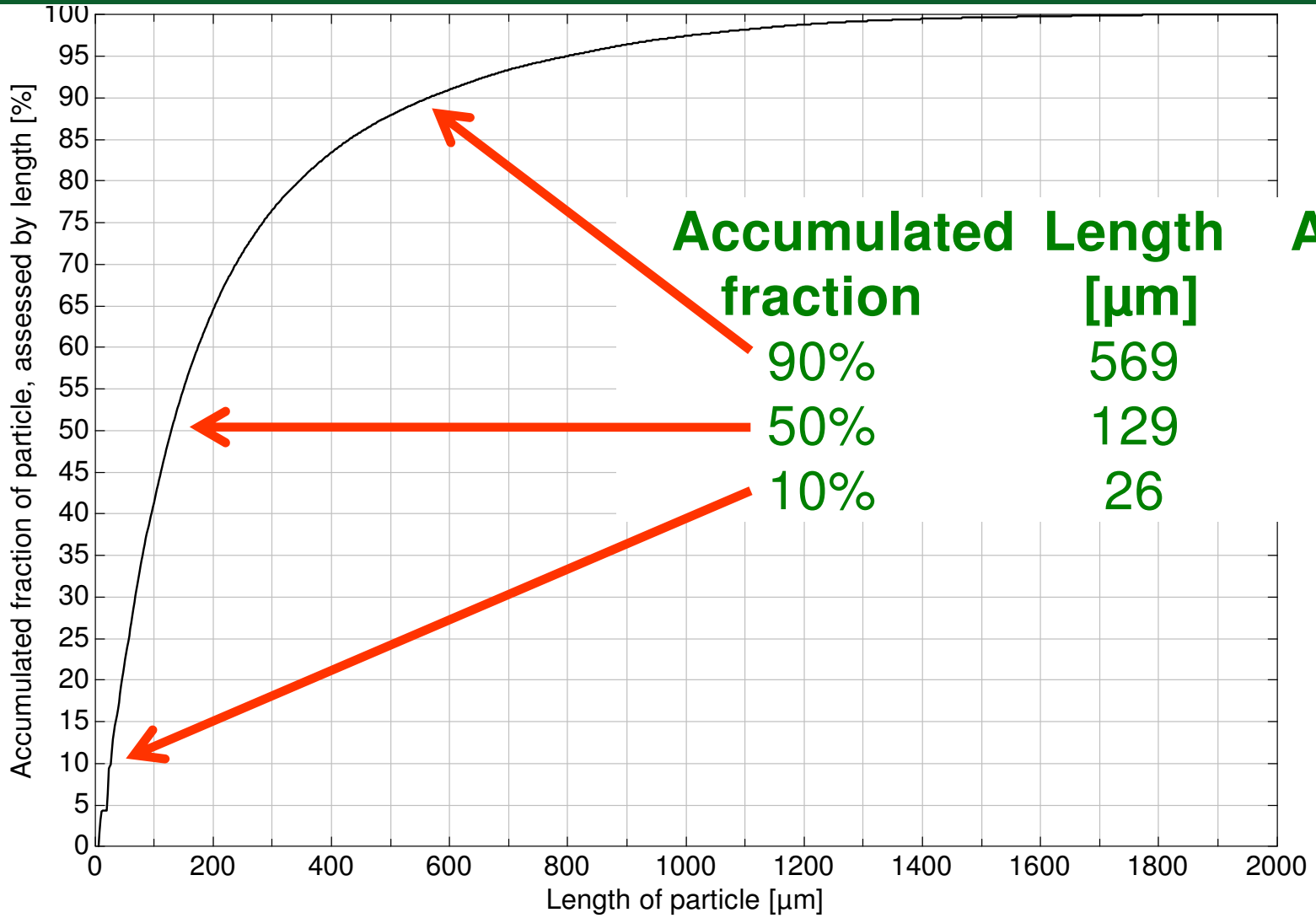
Which size and shape have wood particles?

Optical Particle Analysis



Eigenschaft	Wert	Einheit
EQPC	1469.715	µm
FERET_MAX	5179.615	µm
FERET_MIN	880.604	µm
LEFI	5485.799	µm
DIFI	204.510	µm
VBFD	700.787	µm

Results (n = 339 136)



Accumulated fraction	Length [µm]	Aspect ratio
90%	569	9.5
50%	129	4.5
10%	26	1.8