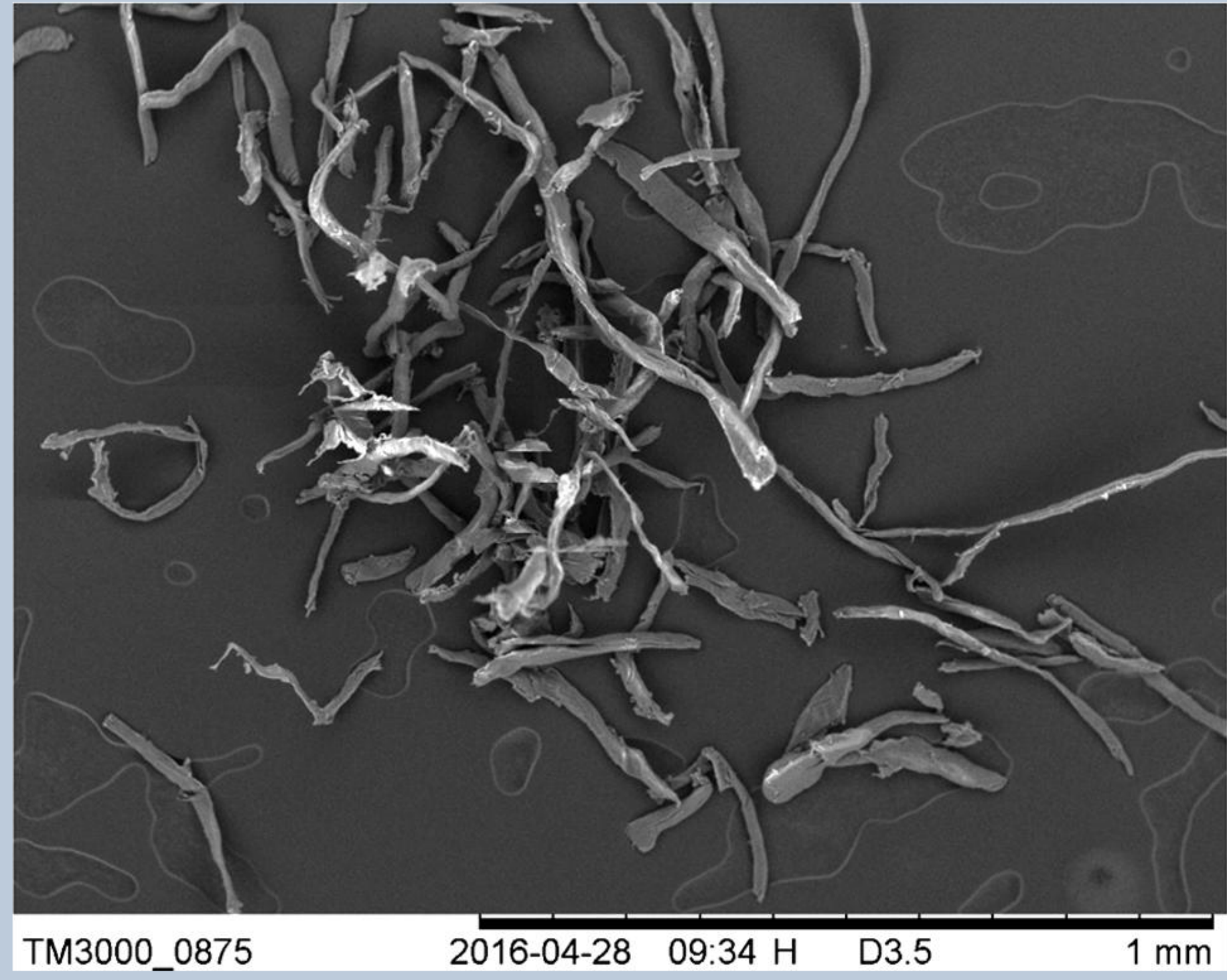


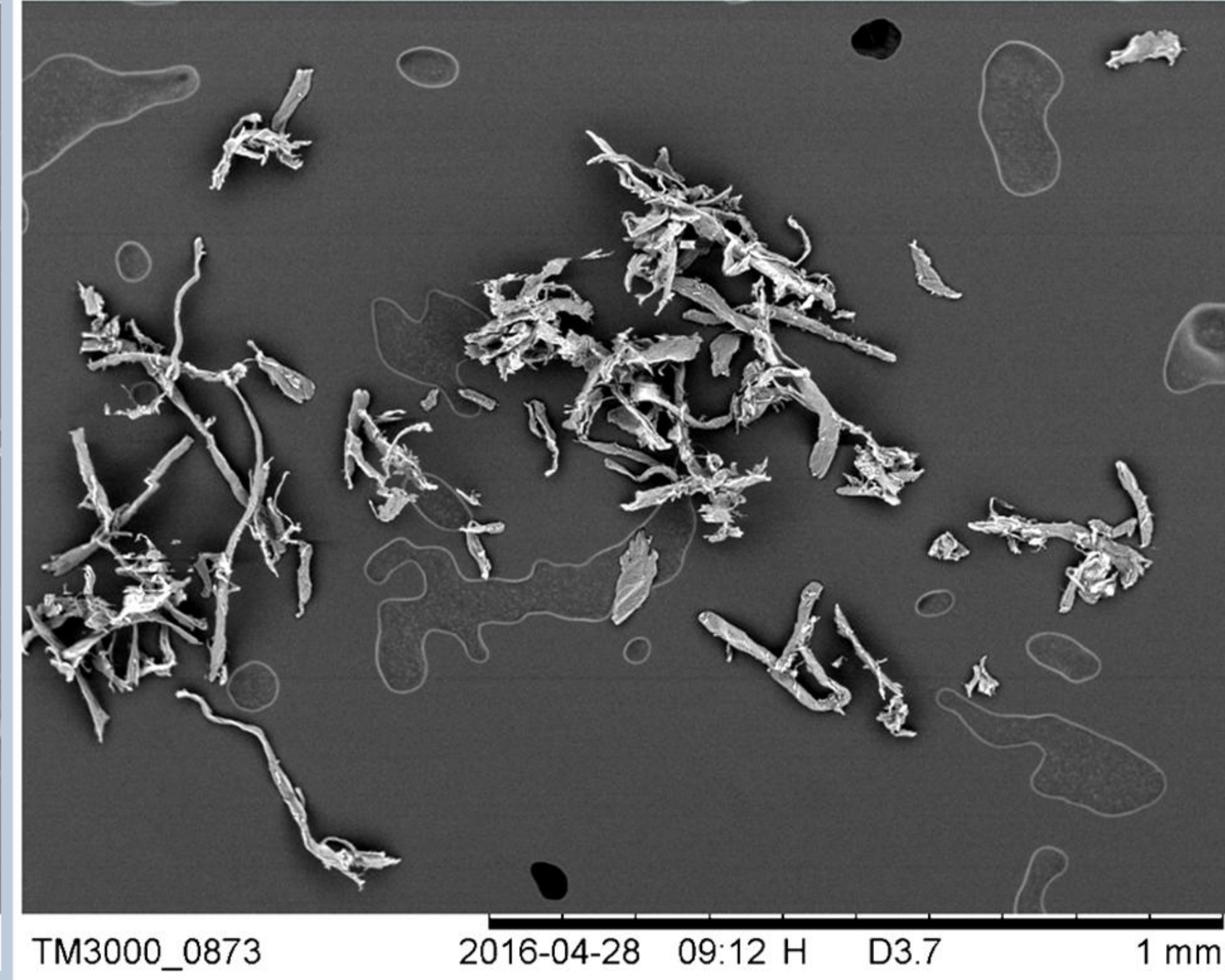
Quantitative determination of Nitrocellulose fines, fragments and dust by a sedimentation method.

Mario Paquet, Ian Levac

Fibers



Fines

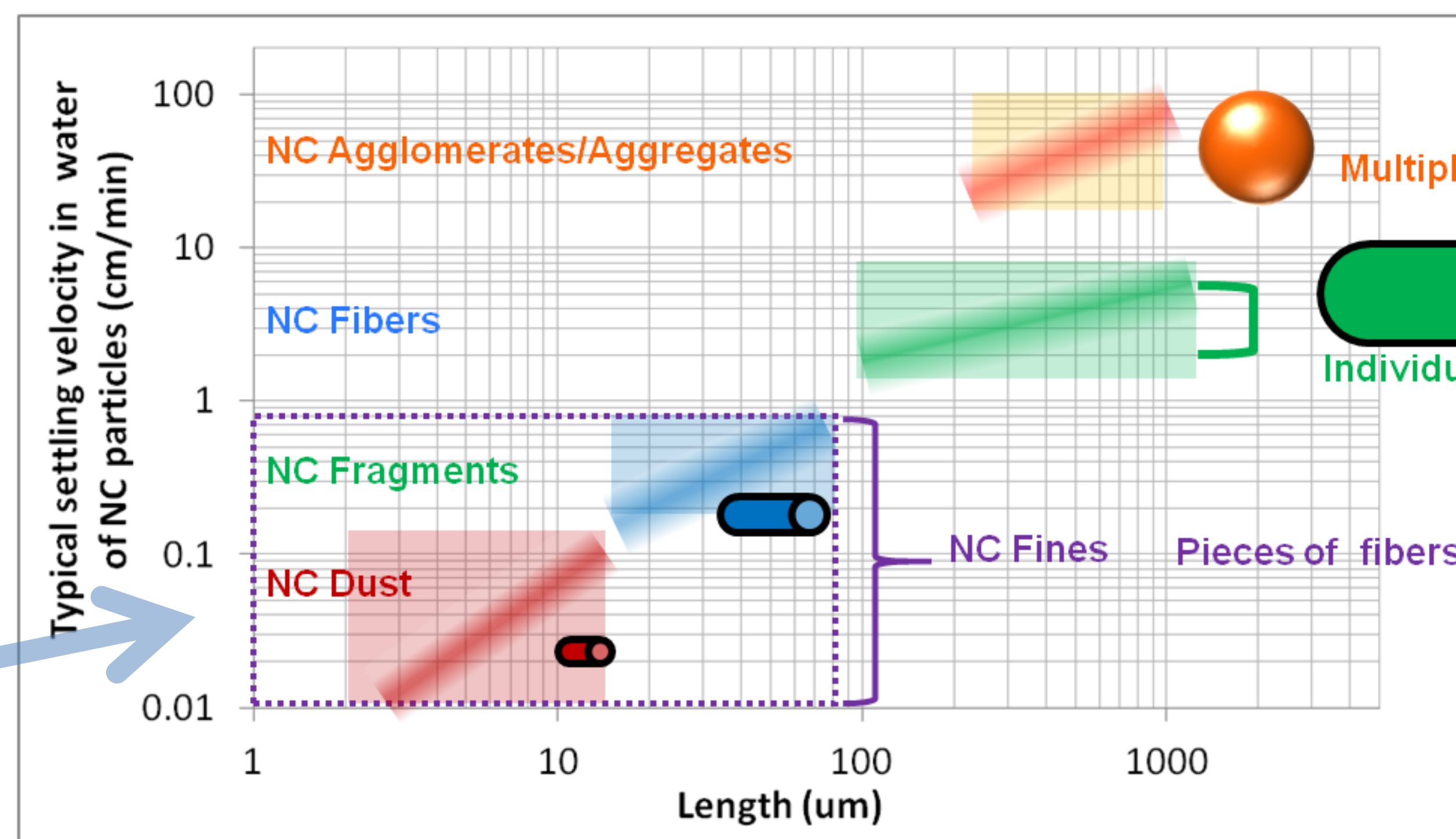


Types of NC particles: length and settling velocity

Similar to the fineness method
Sedimentation

Best method for NC:
 Sufficient fractionation
 relative to length, easy,
 cheap and fairly rapid

Elutriation and
 sedimentation:
 Attempt
 classification
 by terminal velocity



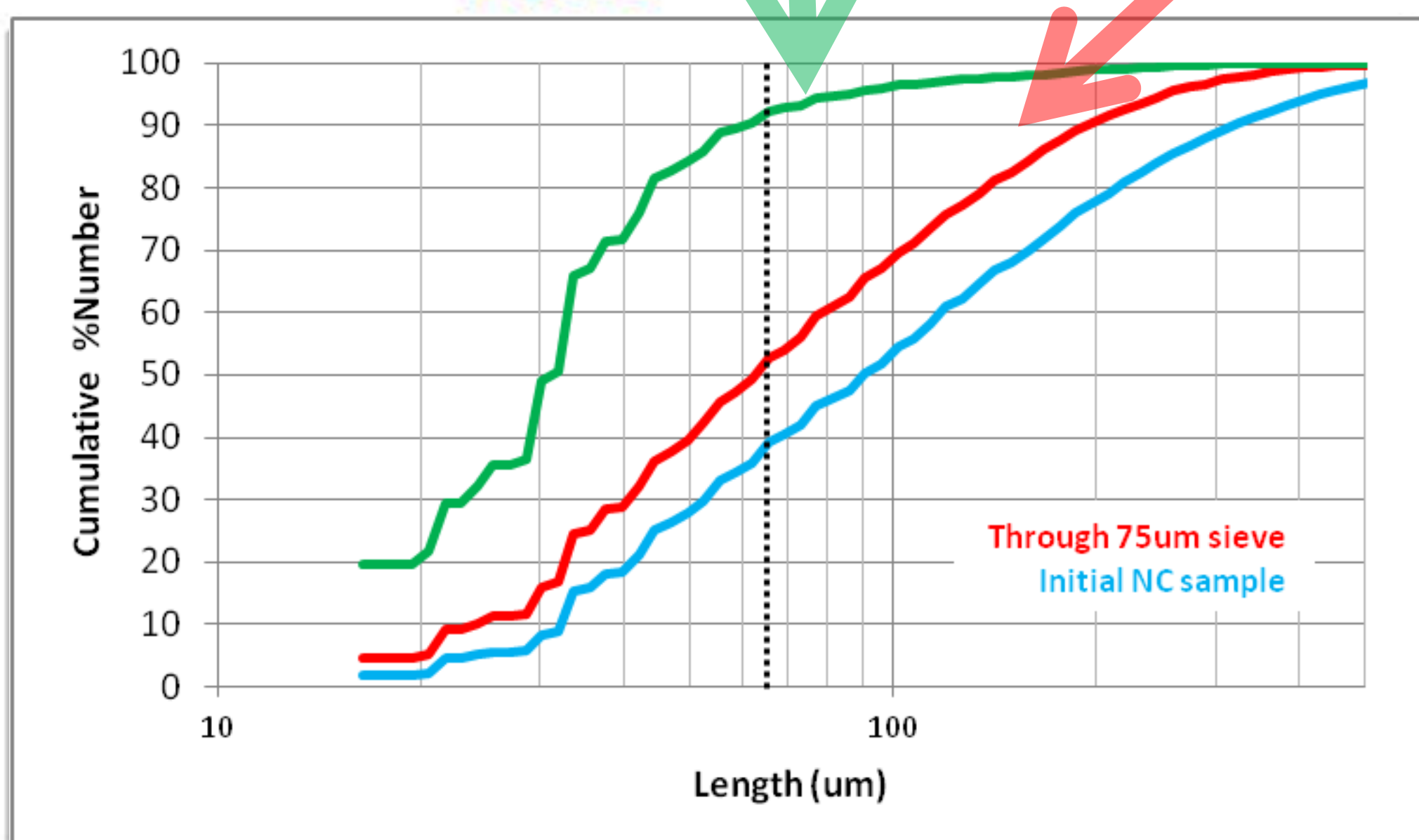
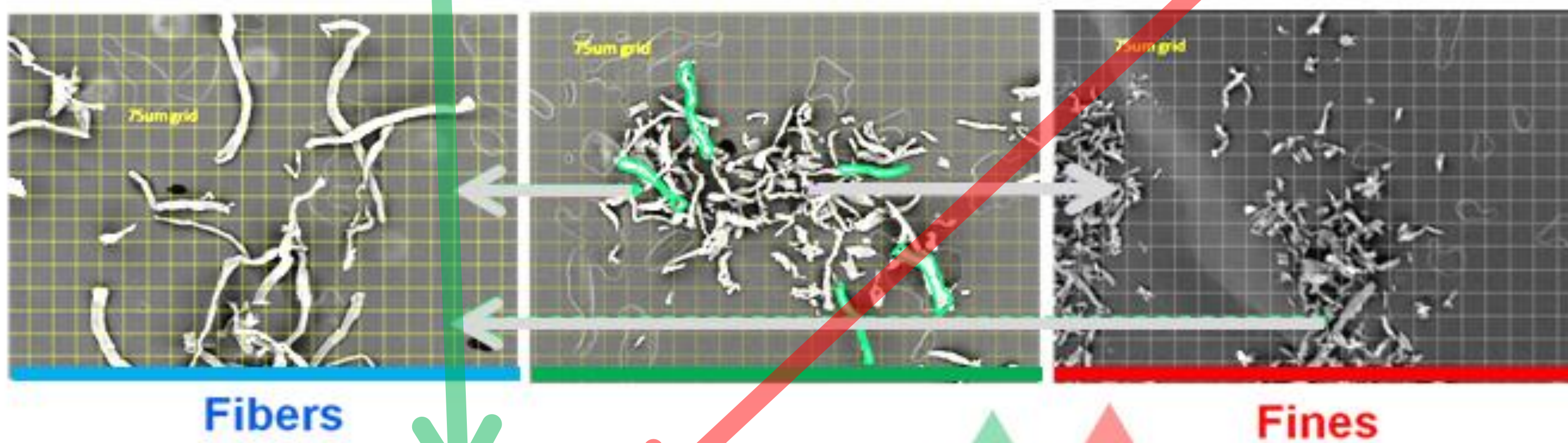
Method for
 agglomerates/aggregates
Elutriation

Requires a stable flow gradient:
 For NC fibers/fines, sensitive to
 thermal and eddy variations in
 the gradient flow

Screening :
 Attempt classification by length

Classic method for
 cellulose
Screening

For NC: Does not
 sufficiently
 discriminate even
 between types



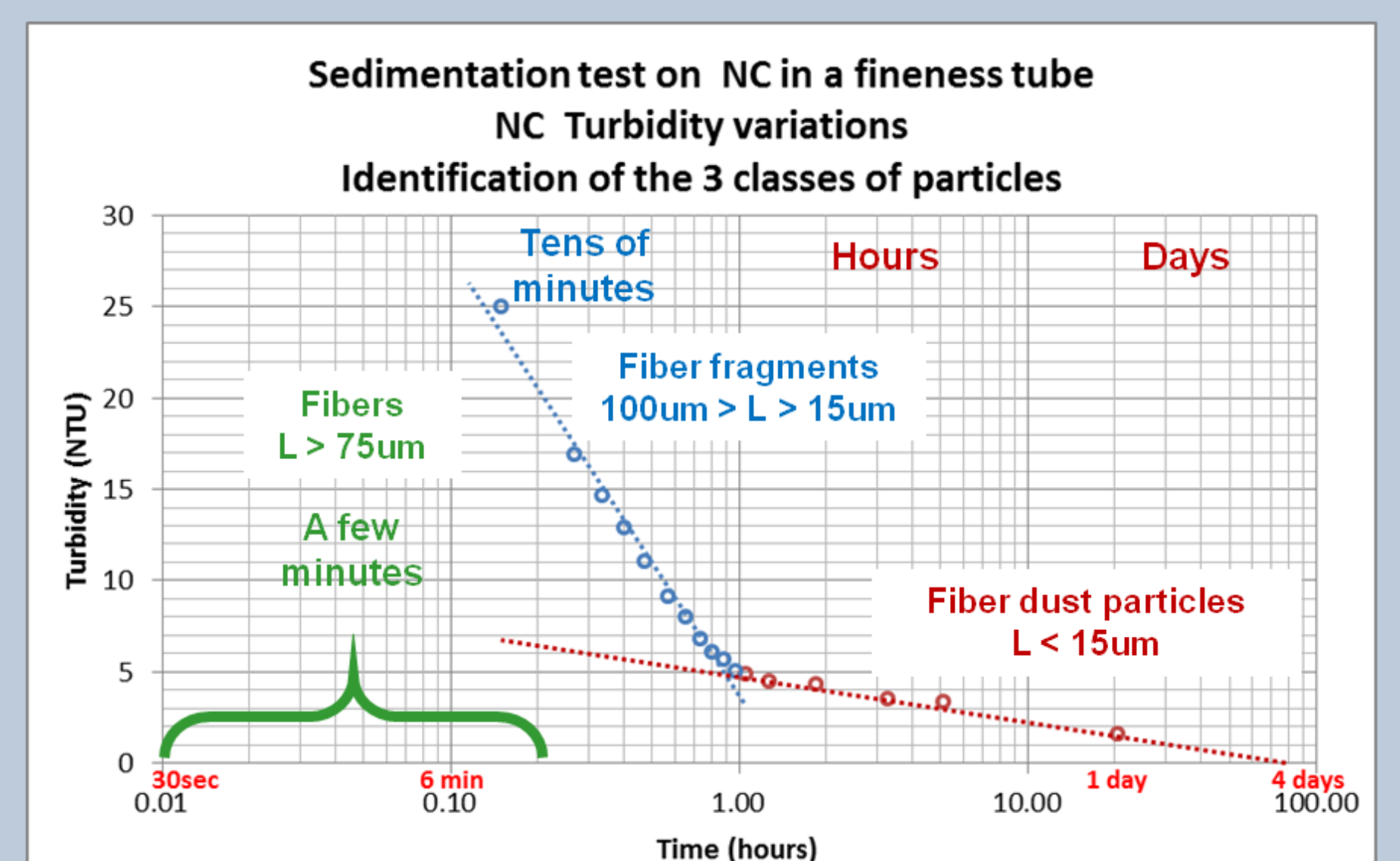
NC sedimentation in water

Particles up to about 100 um are
 included
 Much more effective separation

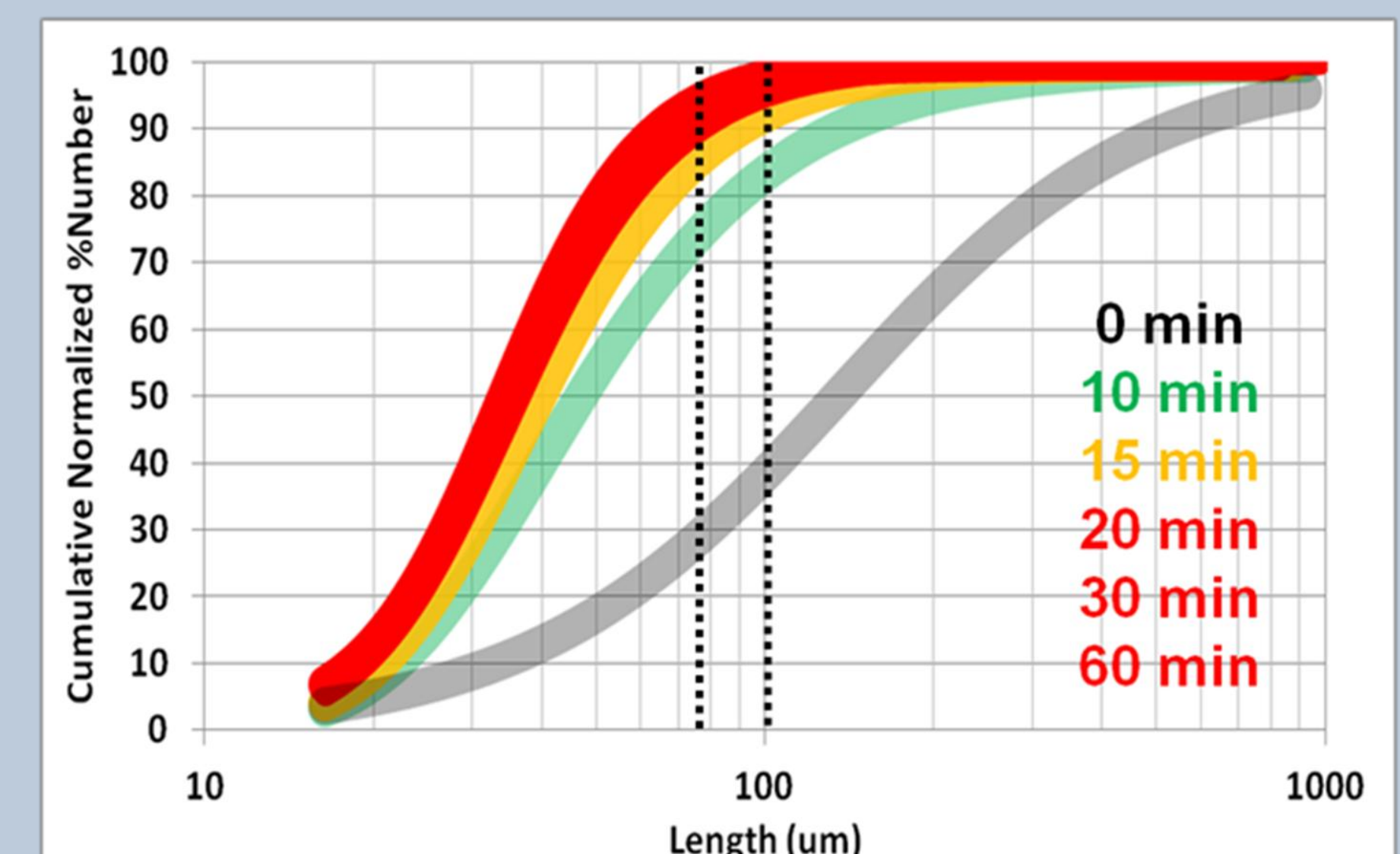
NC through a 75um sieve

Particles up to 250-300 um are
 included
 Inadequate separation

NC settling rate in water: Fragments and Dust

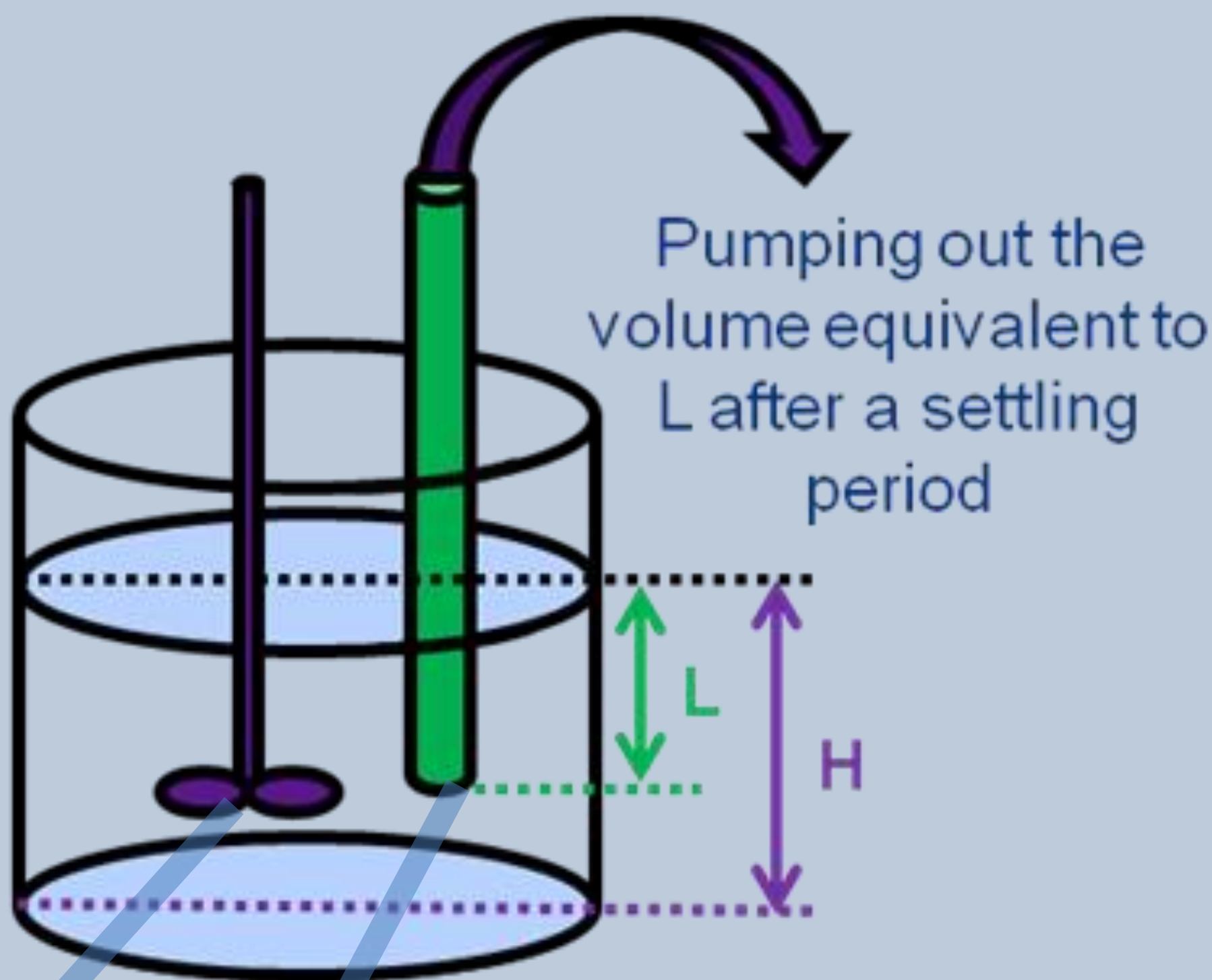
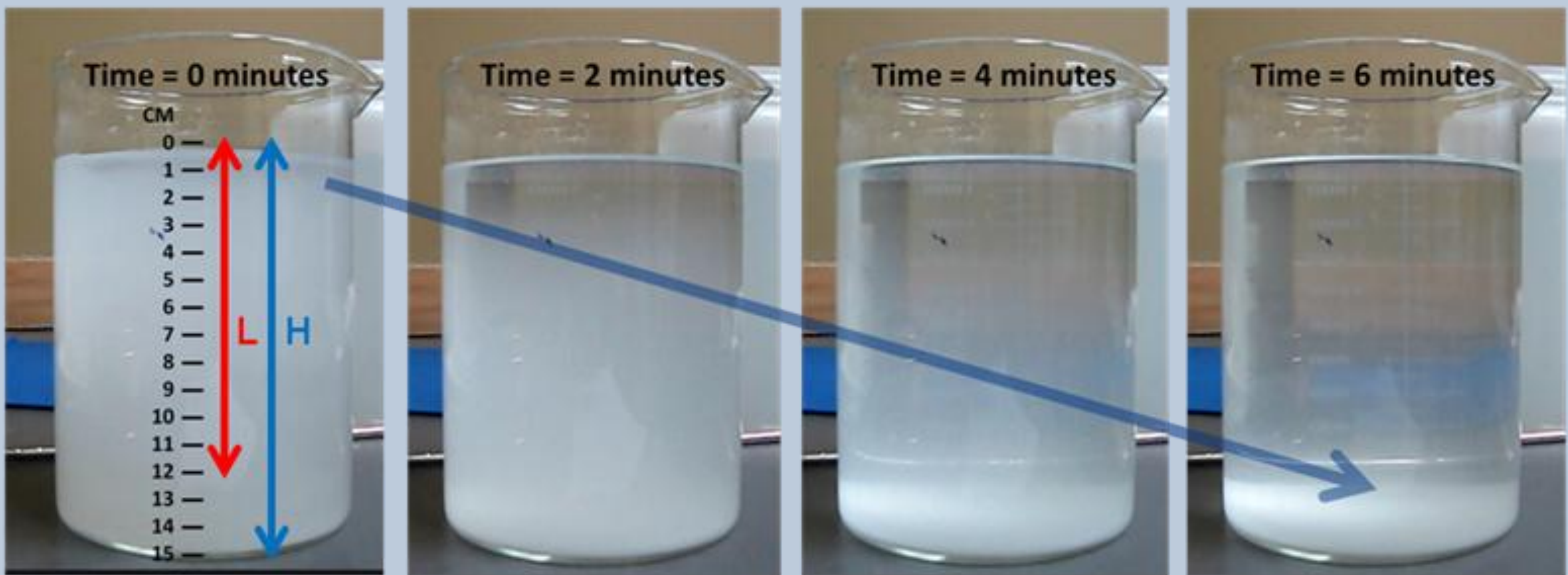


NC settling rate in water:
 Effect of settling time on quality of classification



**Quantitative determination of Nitrocellulose
fines, fragments and dust by a sedimentation method.**

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Most NC fibers settle at a rate of 2 - 5 cm/min

For separation of fines from fibers: Settling time about $L / 0.75$
For separation of dust from Fragments: Settling time about $L \times 10$

- 2 liter tall form plastic bottle with leak proof cap
- 2 marks on the bottle:
 - One at 2000 ml
 - Another at 500 ml
- One 4.5mm hole at the 500 ml mark
- Container to recover NC particles (represented: a recovery pail to filtrate and retain NC fibers)



Estimated % recovery base on ratio of water removed and # of washes

# wash	Ratio removed					
	0.9	0.8	0.7	0.6	0.5	0.4
0	0.0	0.0	0.0	0.0	0.0	0.0
1	90.4	82.1	71.7	60.3	49.2	39.1
2	99.1	96.8	92.0	84.3	74.2	63.0
3	99.9	99.4	97.7	93.7	86.9	77.5
4	100.0	99.9	99.4	97.5	93.3	86.3
5	100.0	100.0	99.8	99.0	96.6	91.7
6	100.0	100.0	99.9	99.6	98.3	94.9
7	100.0	100.0	100.0	99.8	99.1	96.9

Example: Separation of Fines from Fibers

H = 15 cm (a beaker) about 2000 ml
L = 12 cm (1600 ml) and H-L = 3 cm (400 ml)
Ratio removed = 0.8
NC dry weight = 2.0 g
Final level of fibers about 0.15 cm (20 ml)
Target settling time = about 16 minutes
of washes for >95% recovery = 2 → 97%
of washes for >99% recovery = 3 → 99%

**Typical fines content for
various NC samples from
different manufacturers**

Gravimetric sedimentation method for content in fines in NC		
Supplier	Grade	% Fines
AA	B	6.5
AA	A	5.5
AA	A	9.7
BB	A	7.5
BB	C	5.7
CC	B	9.9
CC	A	5.4
CC	C	6.5
DD	C	7.8

On 5 replicates: 6.5% ±0.7%
Typical fines content for most NC 7% ±3%