



## Collagen Fibres Measurements

### Ankersmid DSA-10 in Biotechnology

#### Introduction

Collagen is a fibrous protein that constitutes about 25% of all of the protein in our body. Collagen provides structure to the body, protecting and supporting the softer tissues and connecting them with the skeleton. In addition collagen matrices are capable of hosting cells and instructive molecules.

All of these properties make collagen an ideal biomaterial for a variety of applications in tissue engineering. However collagen use is still limited due to the difficulty in controlling its rate of degradation without changing the biological properties.

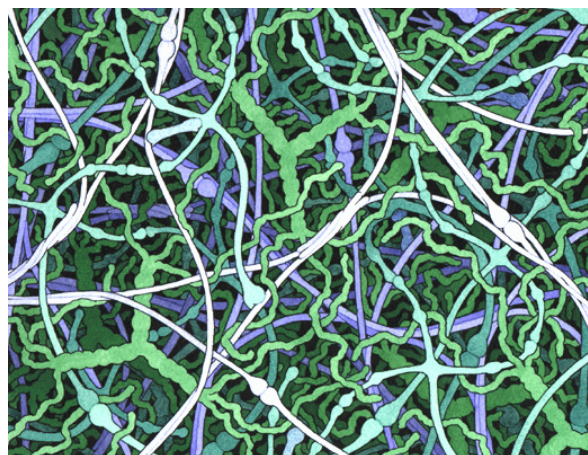


Fig 1- Collagen matrices

#### Requirement

Equipment for measuring indicative parameters of degradation rate, such as specific length and width of collagen fibres, in an automatic, accurate and efficient method.

#### Instrumentation

##### DSA-10 – Dynamic Shape Characterization System

The Ankersmid Dynamic Shape Analyzer, DSA-10, is a dedicated laboratory shape system for analyzing size and characterizing shape of particles in motion. The particles are either dispersed in liquid or gas or on a slide. Comprehensive particle analysis is obtained through the unique combination of a synchronous strobe light source and video microscope technology. All particles are fully classified by numerous shape parameters including specific length and specific width.

An automatic flow controller (LFC-101) is used to flow the particles through the measuring cell. A video microscope camera synchronized with strobe light captures "still" images continuously while particles are in dynamic flow. The images are enhanced, processed, and analyzed automatically to ensure full representation of the sample. Accurate results are produced in a fraction of the time normally required for microscopic observation.

**Table 1 - Measurement Set-up Configuration**

Video lens	Type	Objective magnification	F.O.V	■/Pix	Range [■]
	Lens EW	1.4x	6200x4500μ	9.5	20-3600
<b>Measurement Cell</b>	Liquid Flow cell, model DSM-4L				
<b>Dispersing Liquid</b>	Phosphate Buffered Saline				
<b>Accessories</b>	Liquid Flow Controller, model LFC-101				



Results

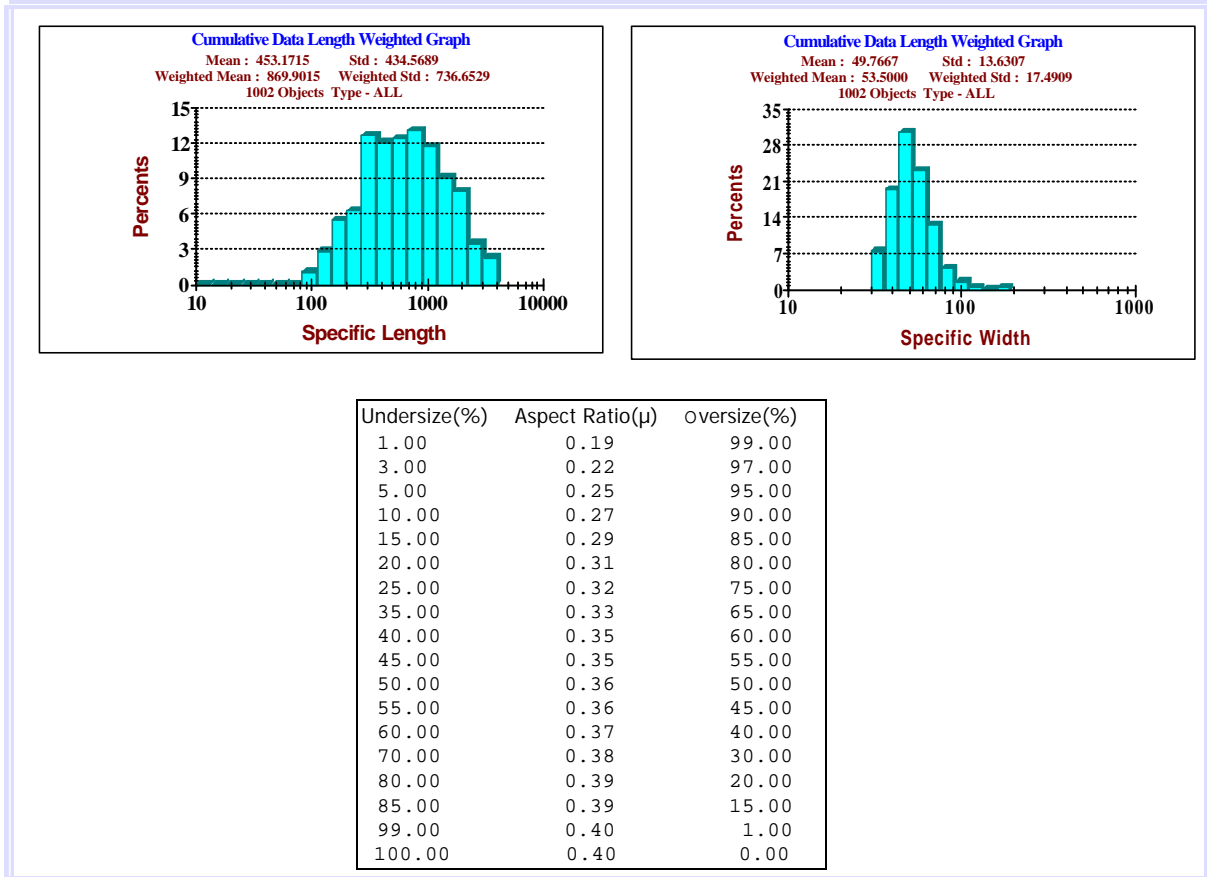


Fig 2 – Specific Length, Specific Width and Aspect Ratio of 5000 collagen fibers

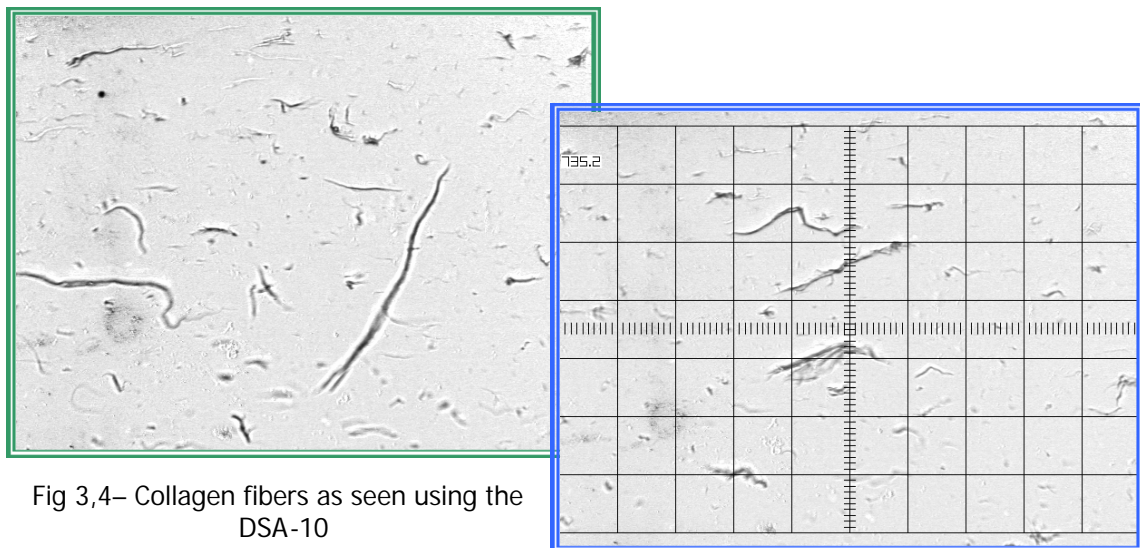


Fig 3,4– Collagen fibers as seen using the DSA-10



Fig 4 –  
Each  
square  
is  
735x73  
5  
microns

### Conclusion

Close tracing of specific length and width of the collagen fibres provides reliable indication on collagen degradation rate and the changes collagen undergoes through the production process. Manufacturers and R&D teams can now use the Ankersmid DSA-10 as an analytical tool for collagen research, quality control and process improvement.

### References

1. David S. Goodsell; Collagen- Molecule of the month, PDB-Protein Data Bank.
2. Karasikov, N.; Krauss, M.; Barazani, G., In *Particle Size Analysis*, Lloyd, P.J Ed.; John Wiley & Sons: New York **1988**.
3. Weiner, B. B.; Tscharnuter, W. W.; and Karasikov, N.; *Improvements in Accuracy and Speed Using the Time-of-Transition Method and Dynamic Image Analysis for Particle Sizing*, Theodore Provder, American Chemical Society, **1998**