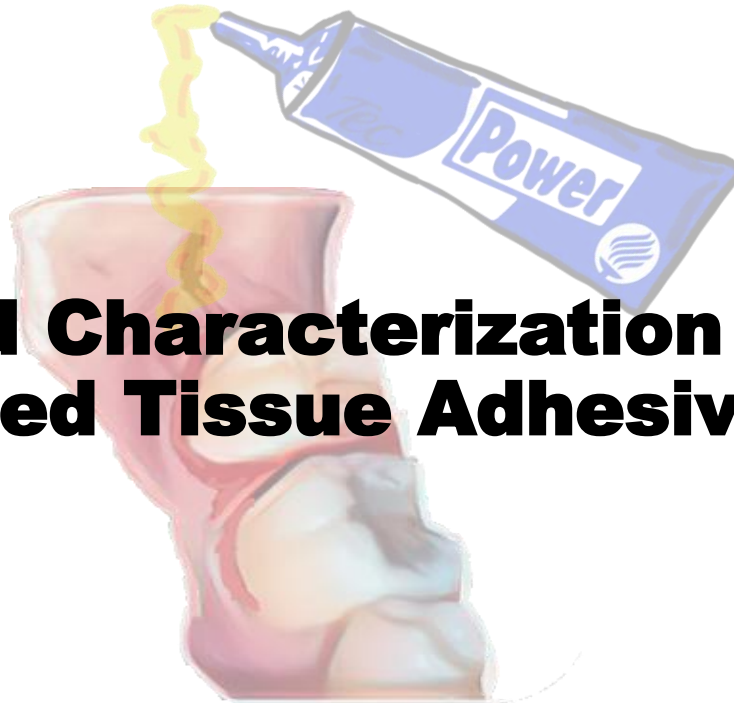




Tecnológico  
de Monterrey



# **Development and Characterization of Tunable zein-based Tissue Adhesives**

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Advisors:

**Dra. Grissel Trujillo de Santiago**

**Dr. Mario Moisés Álvarez**

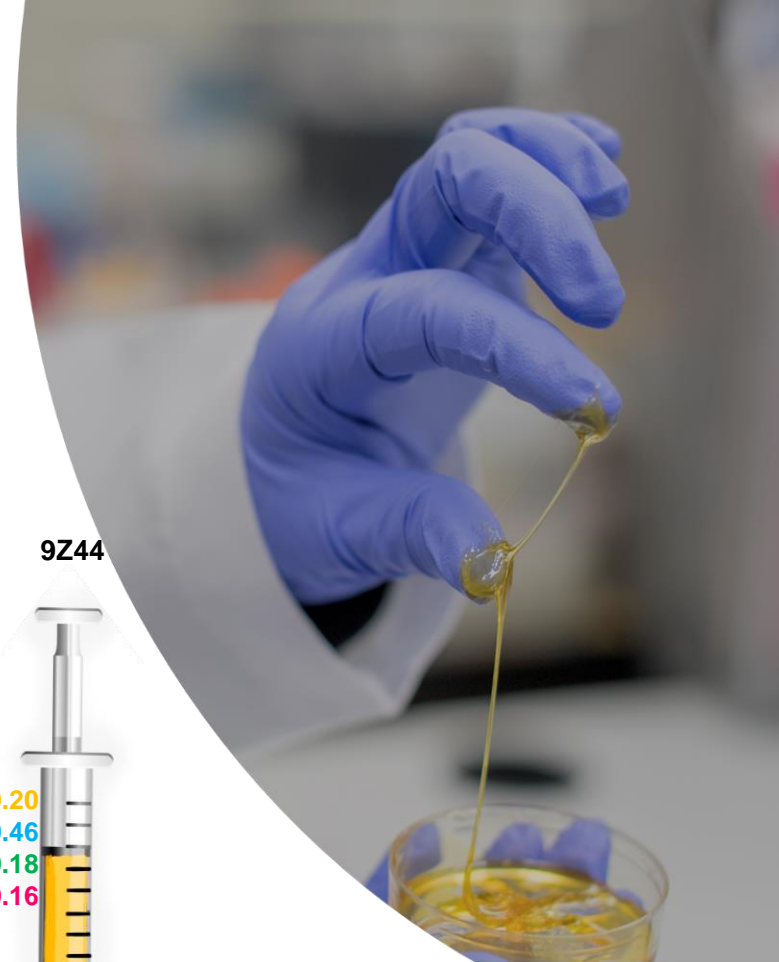
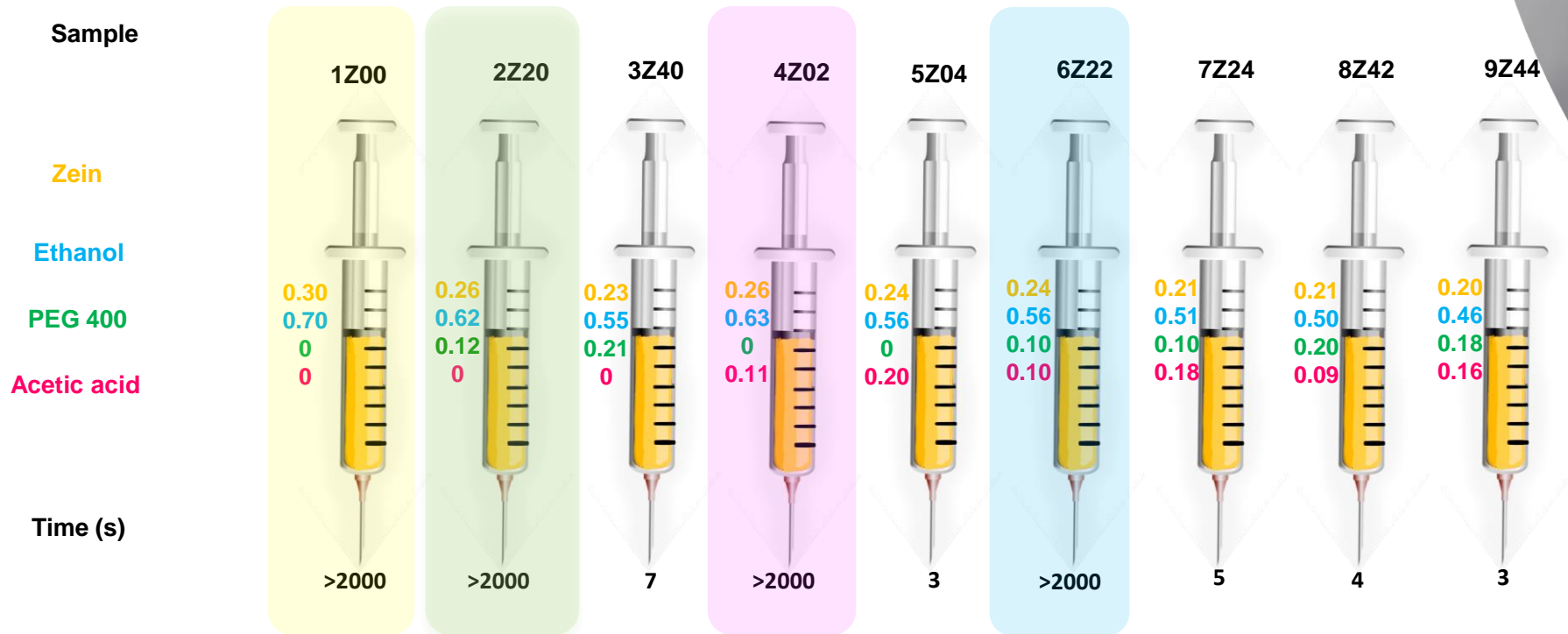
# Introduction



## Sutures

- ✓ Join tissues
- ✓ Specialized techniques
- ✓ Tissue manipulation

# What we made?



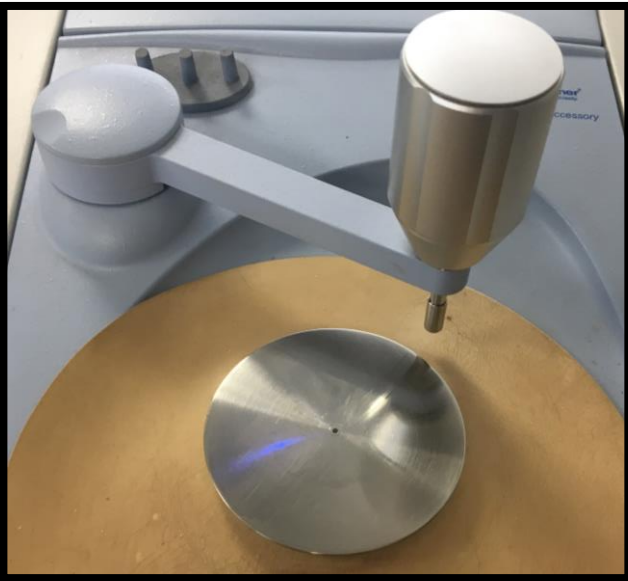
# Characterizations we used



# FTIR Analysis



1Z00, 2Z20, 4Z02 y 6Z22  
Adhesives

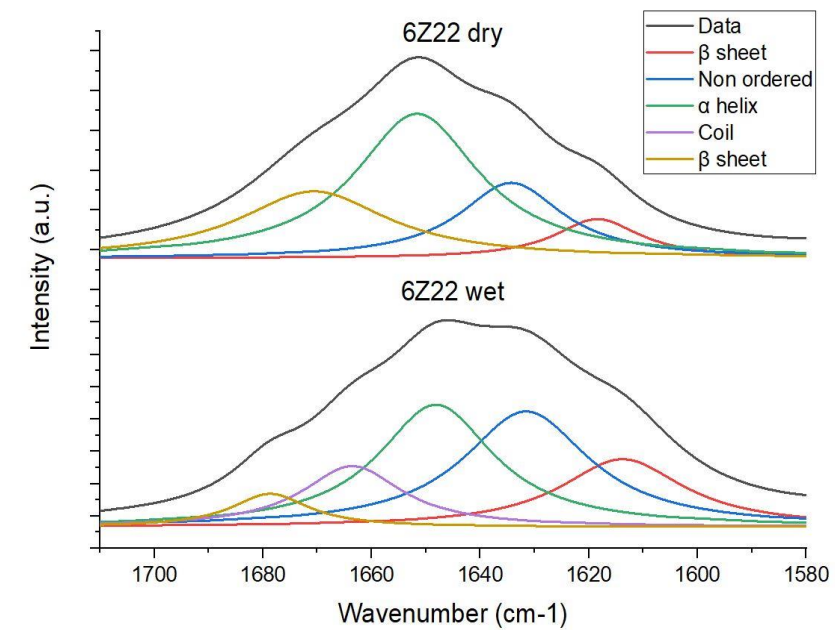
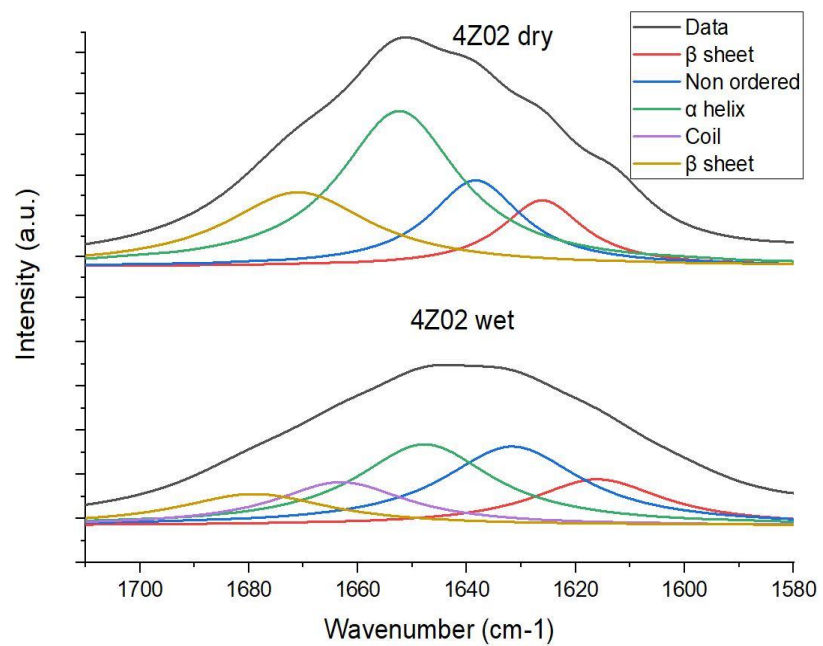
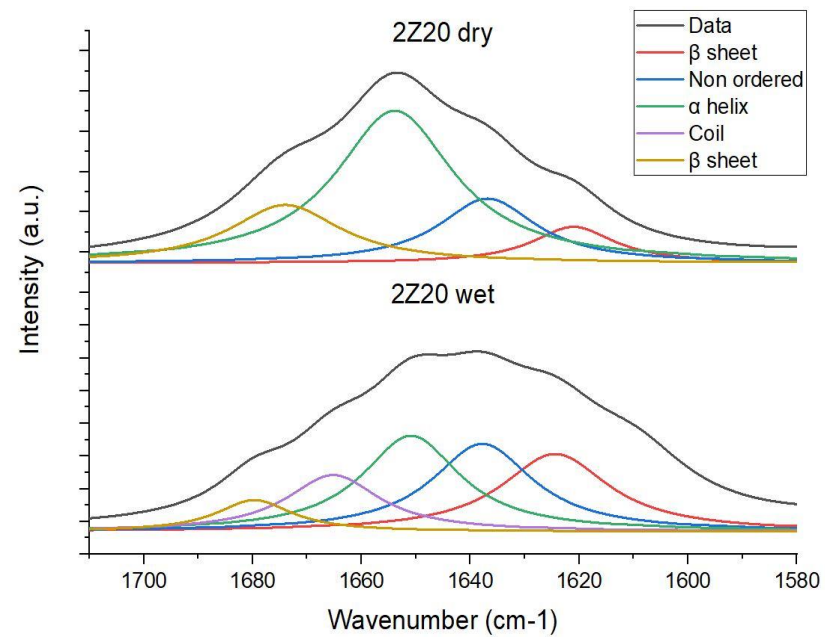
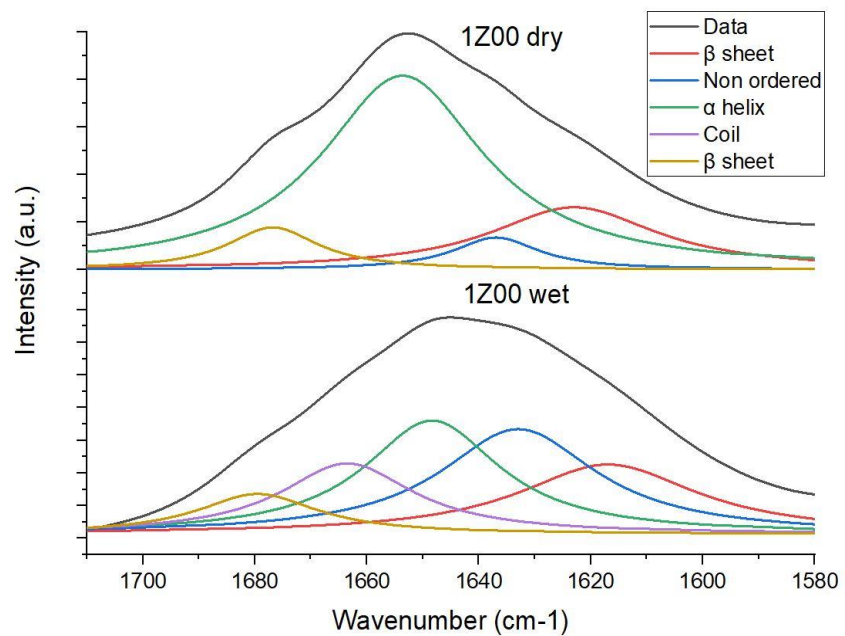


1Z00, 2Z20, 4Z02 y 6Z22  
Adhesives + water

Spectra Analysis

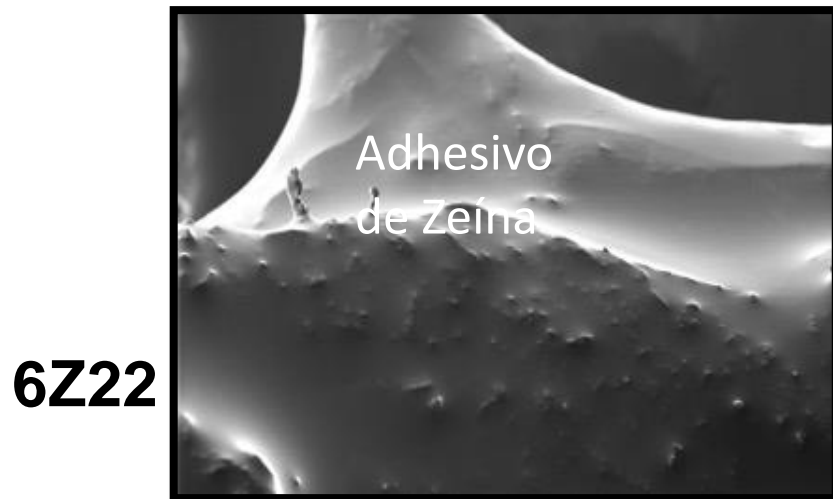
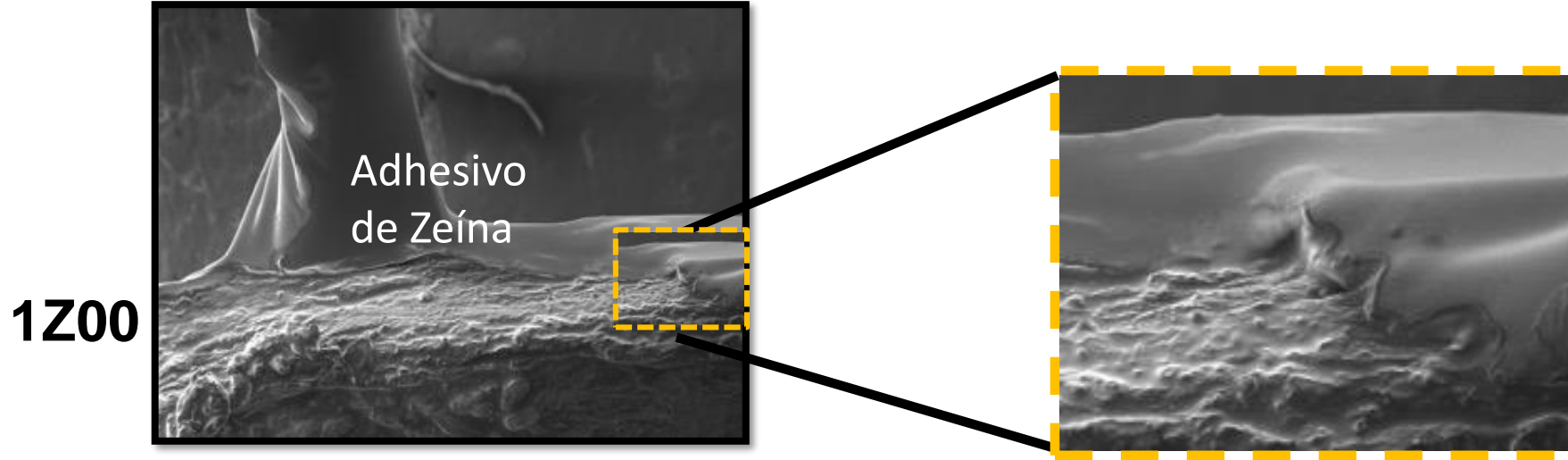
- FTIR Perkin-Elmer, Specrum 400
- No special sample preparation was required
- 64 scans at 4 cm<sup>-1</sup> resolution
- The amide group was identified
- We made a DECOMBOLUTION
- Different structures were observed<sup>5</sup>





# SEM

**Scanning Electron Microscopy** captures images with electrons that come from the surface.



- ✓ Equipment: SEM Zeiss EVO MA25 at 20μm at 300X
- ✓ Porcine skin with adhesive
- ✓ Desiccator for 24 h
- ✓ Gold coating

# Optical microscopy

## Sample preparation

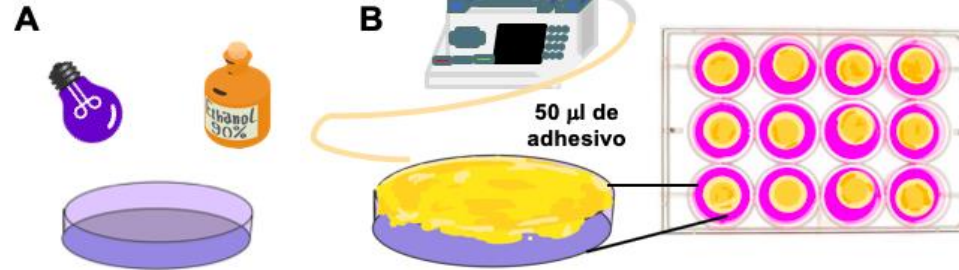
Acrilic disc cuted using a laser

Sterilized acrilic discs  
UV+ Ethanol

Adhesives + discs  
50  $\mu$ L

Seed BJ cells  
 $1 \times 10^5$

Hoechst staining



Remove DMEM/F12

Cover the sample with  
Hoechst

Let incubate 5 -10 min

PBS wash

Excitation 460 – 490 nm

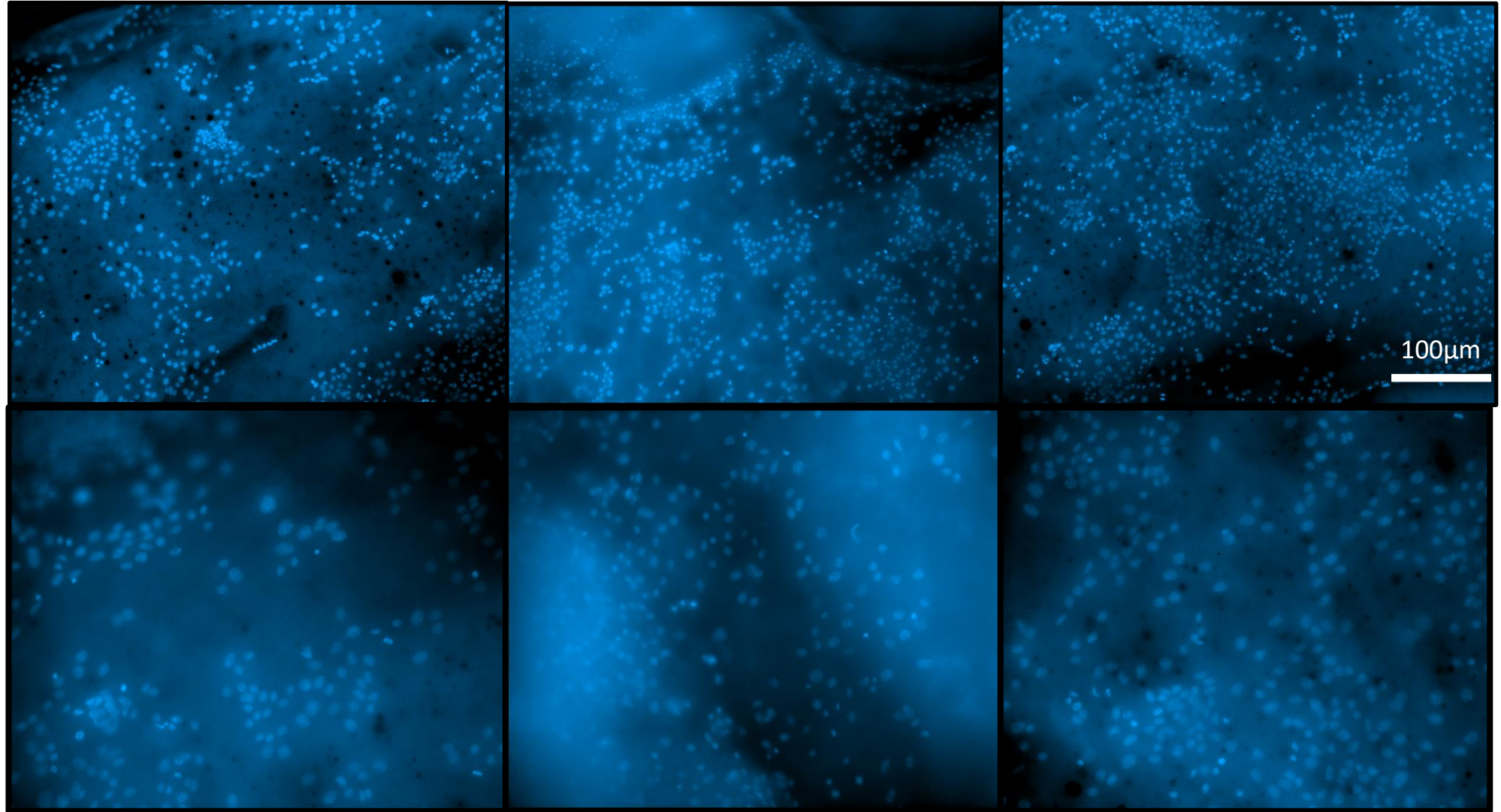


1Z00

Day 1

Day 3

Day 5

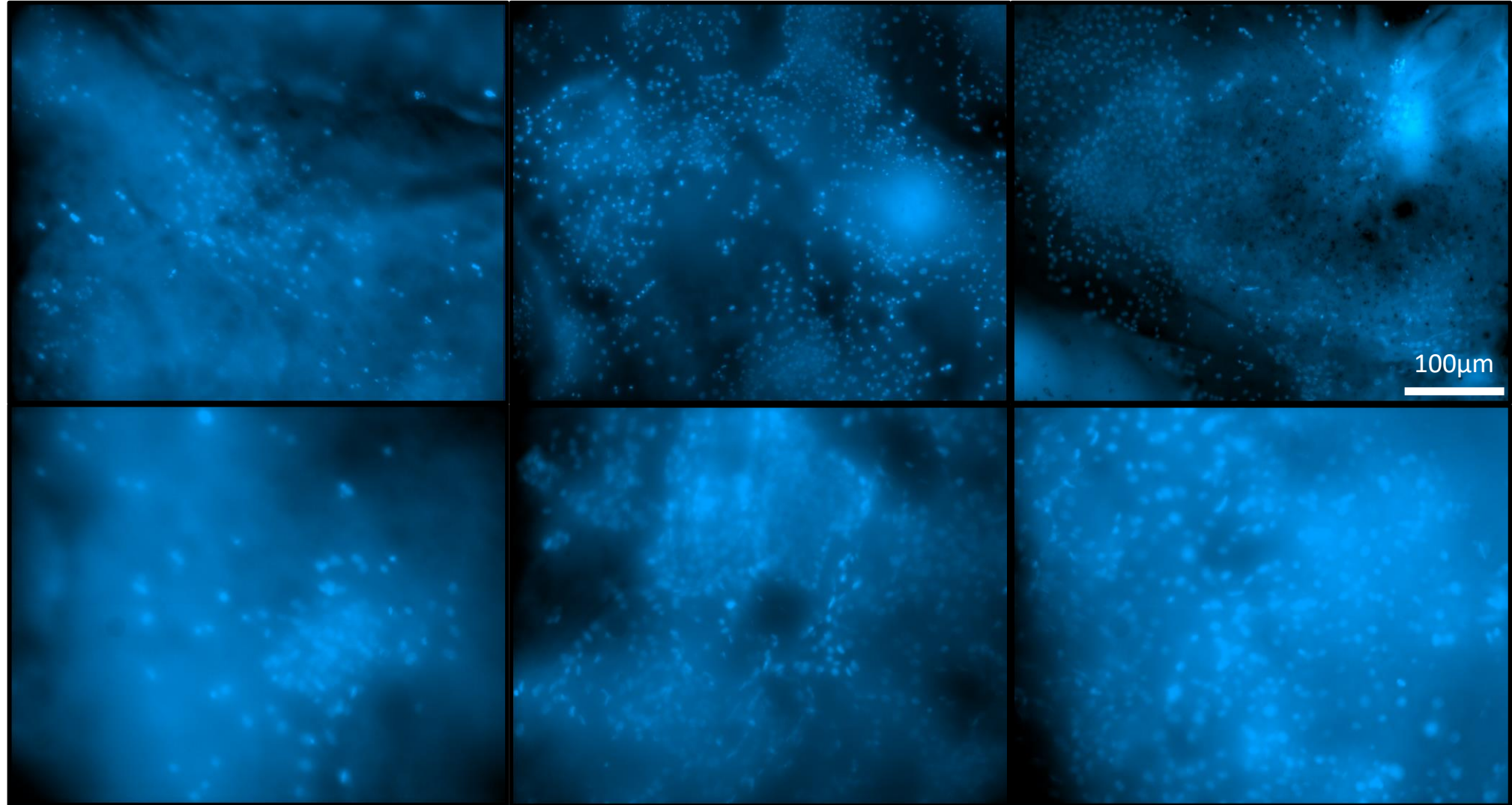


Day 1

Day 3

Day 5

2Z20



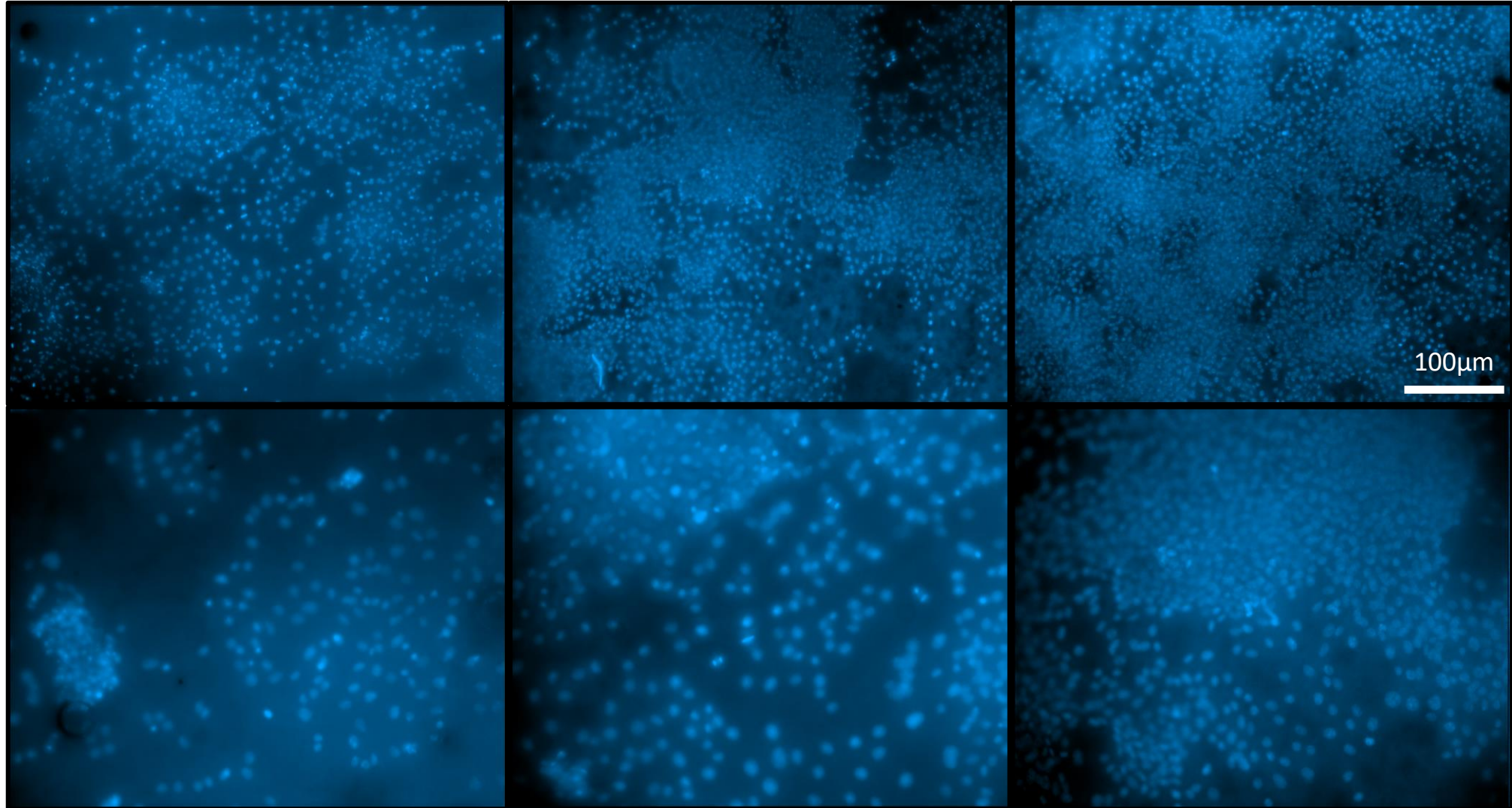


Day 1

Day 3

Day 5

4Z02

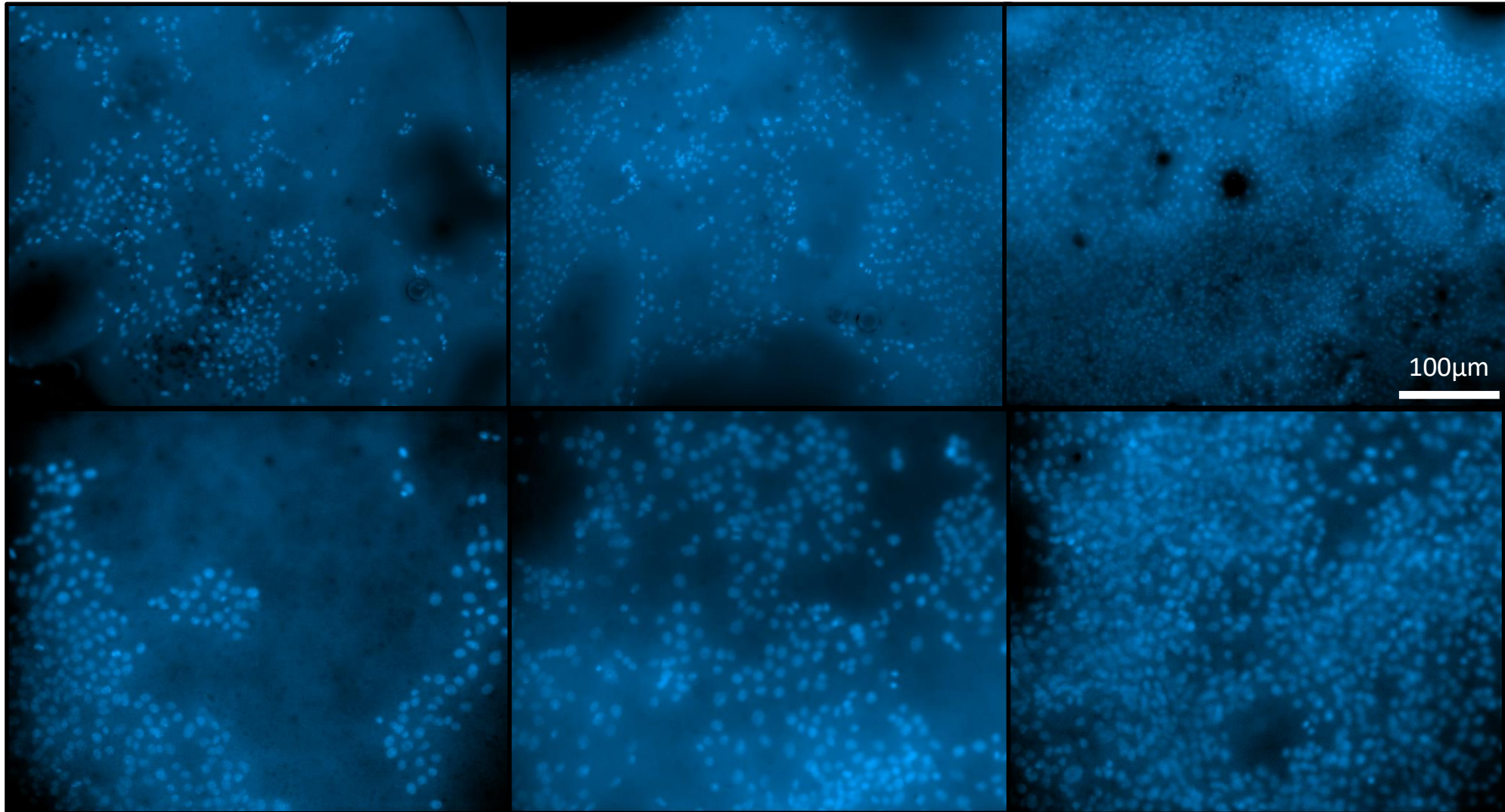


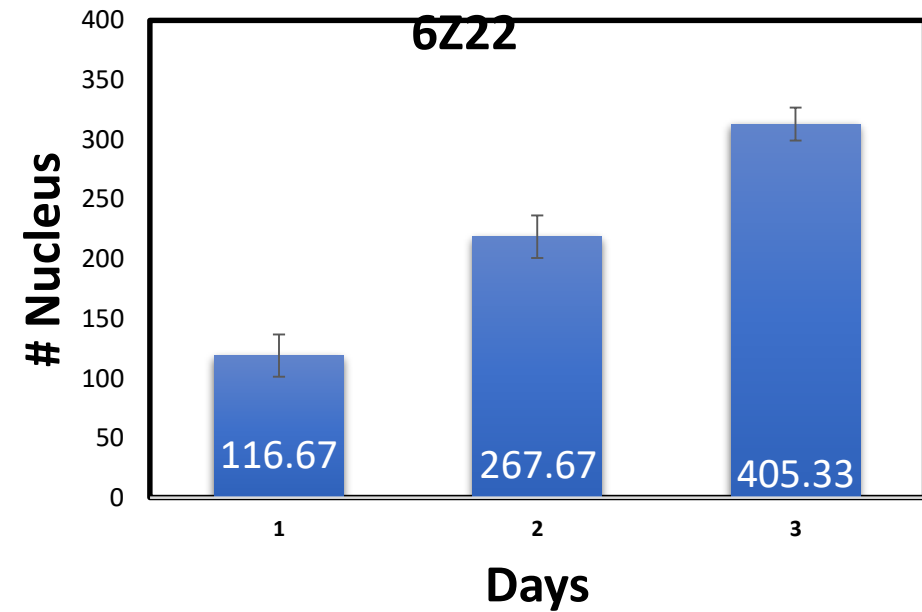
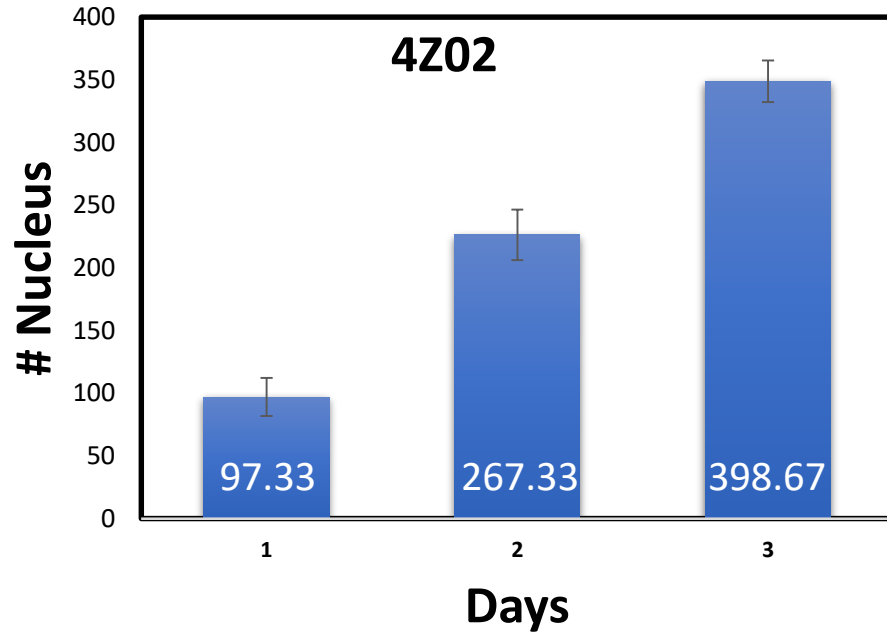
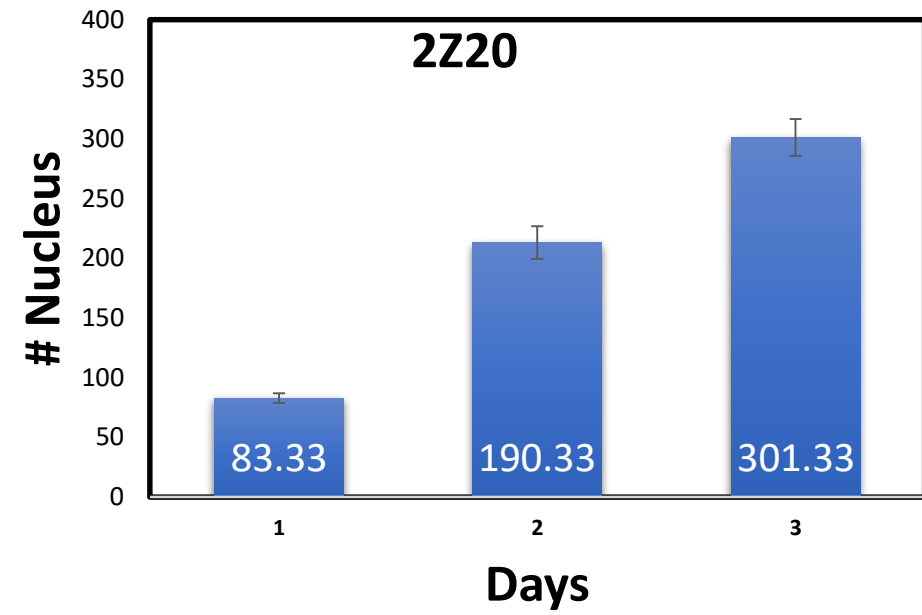
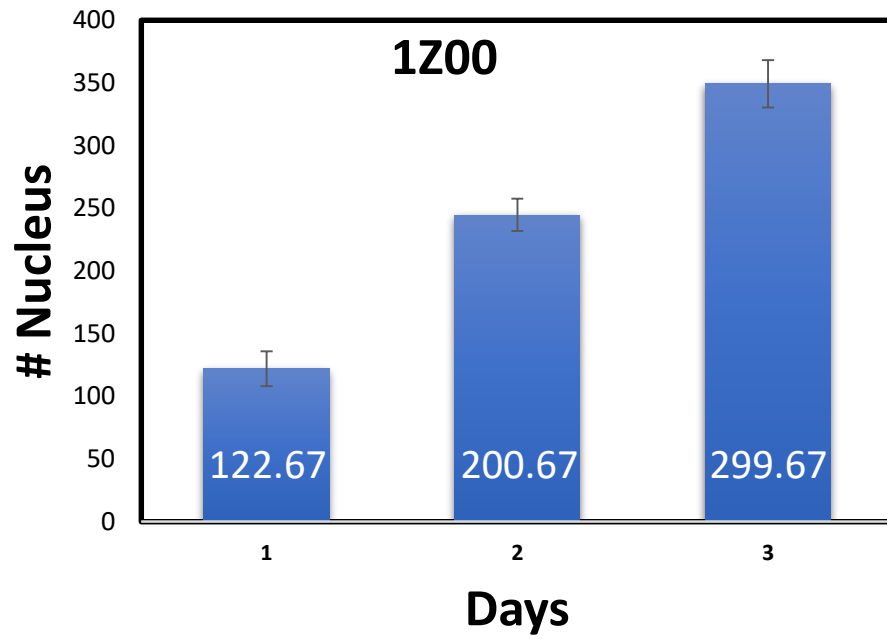
Day 1

Day 3

Day 5

6Z22





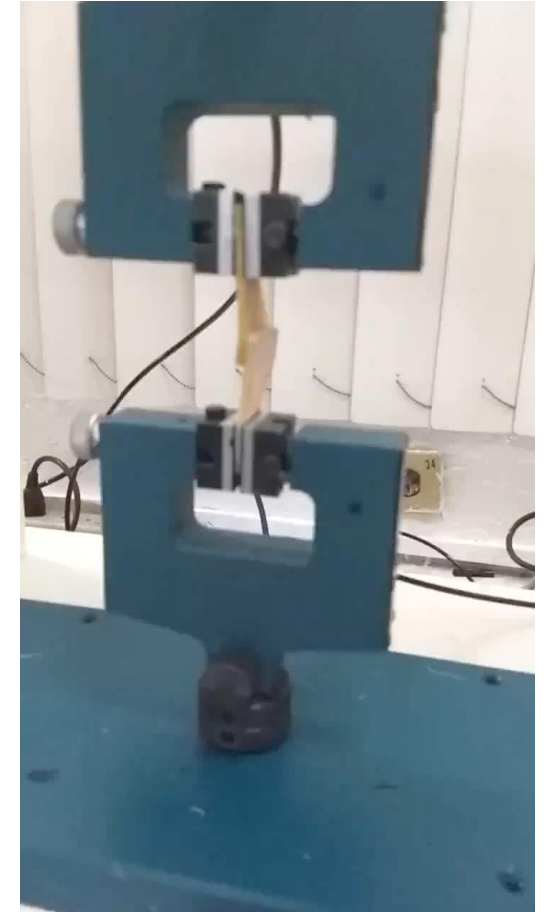
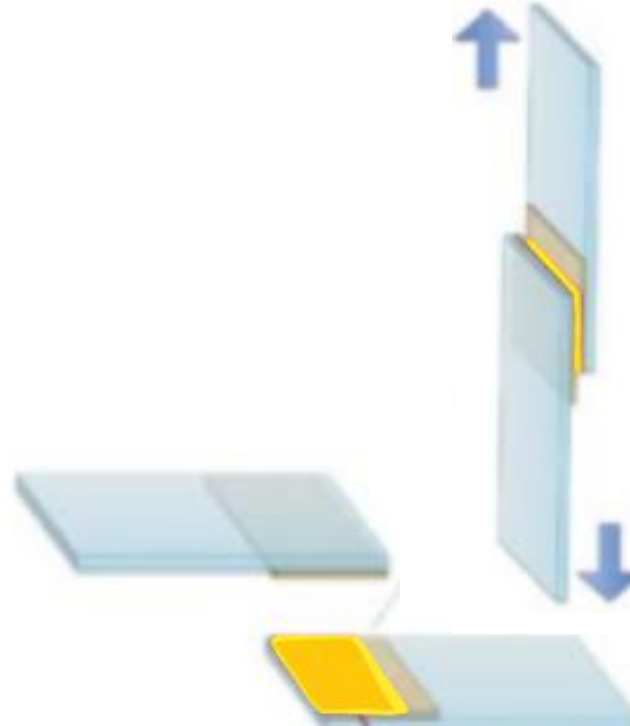
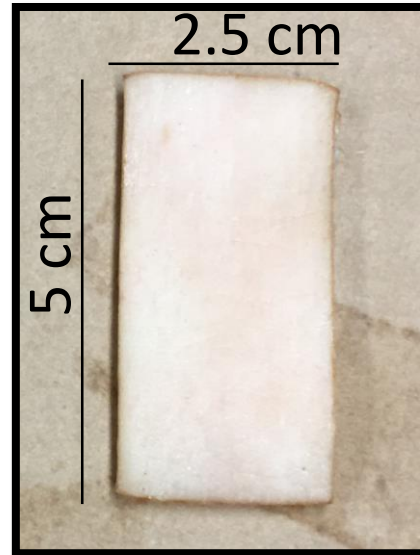


# \* Mechanical Test

## Test tube preparation

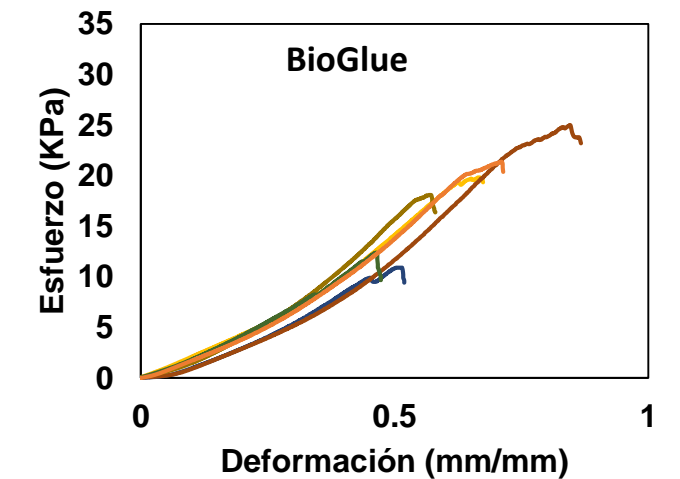
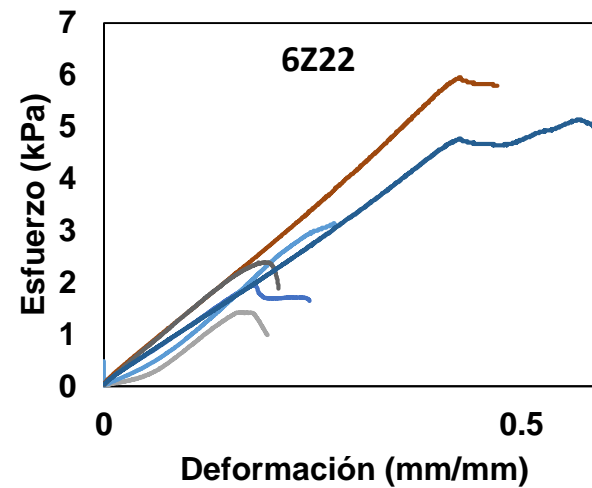
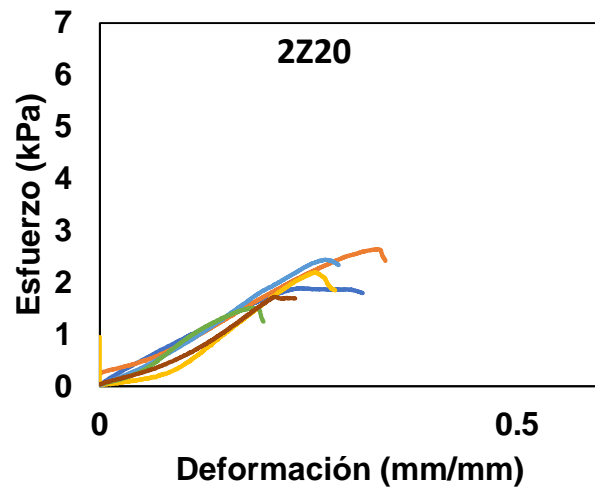
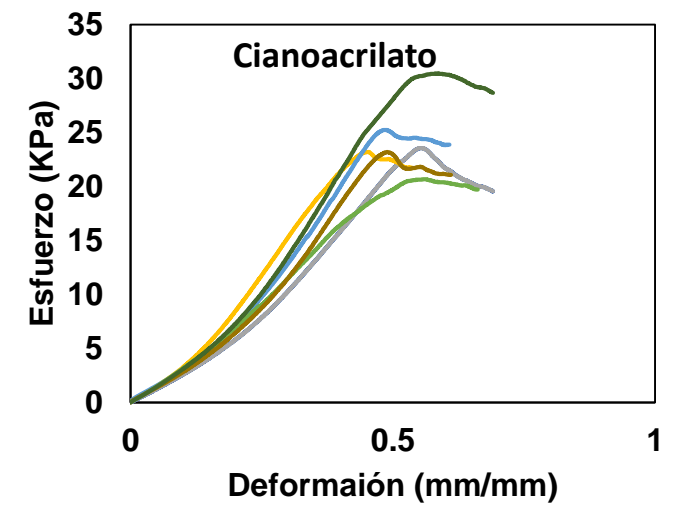
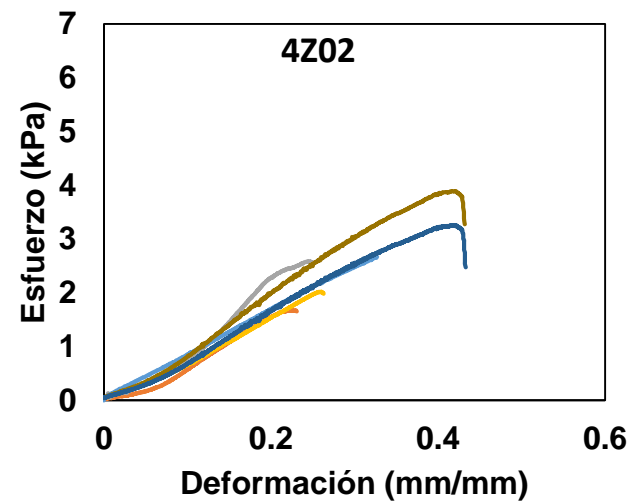
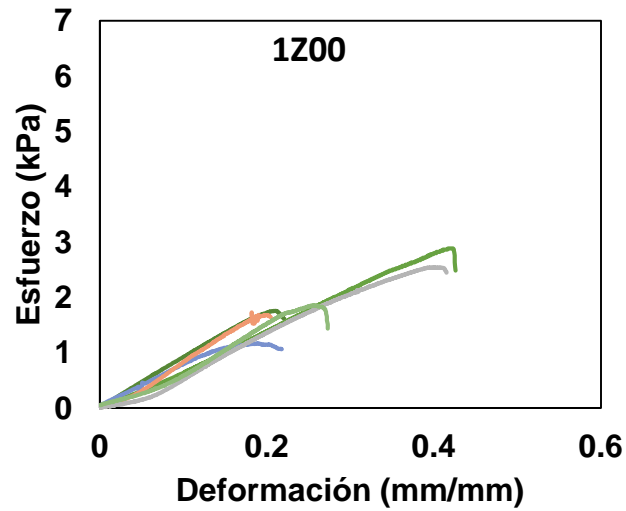
Standard Test Method for Strength Properties of Tissue Adhesives in Lap-Shear by Tension Loading<sup>1</sup>

ASTM F2255





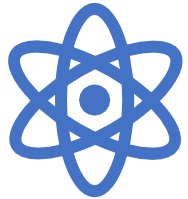
# Mechanical results





Other  
characterizations





## To consider

- Transmission Electron Microscopy (TEM) → Capture images with electrons that go through a thin sample.
- DSC → To calculate the degree of crystallinity.

