

# Adhesive for Fixation of Polyurethane Implants to the Bone

P. Farjam, E.E.G. Hekman, G.J. Verkerke, J. Rouwkema

Department of Biomechanical Engineering, University of Twente

## Introduction

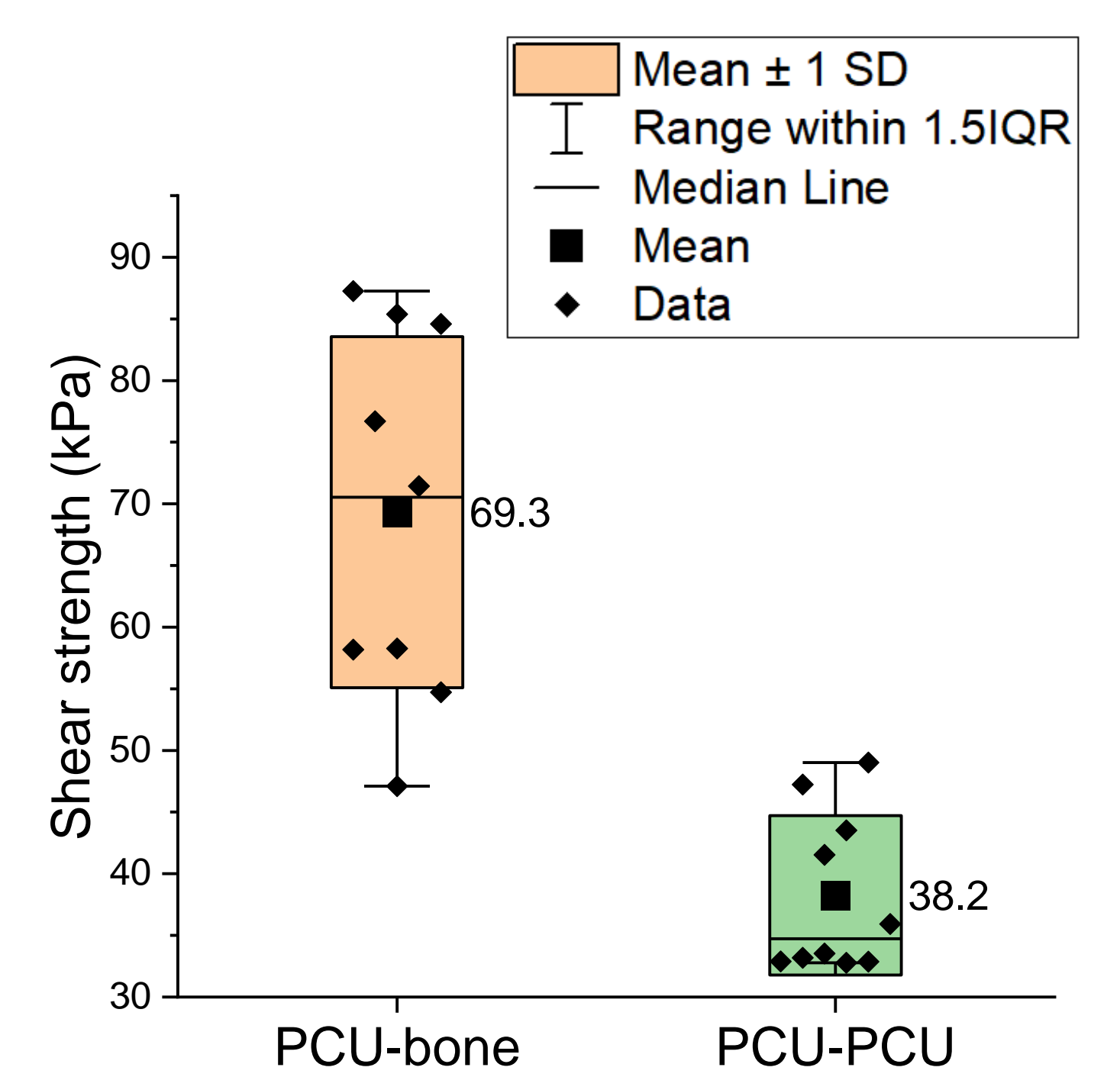
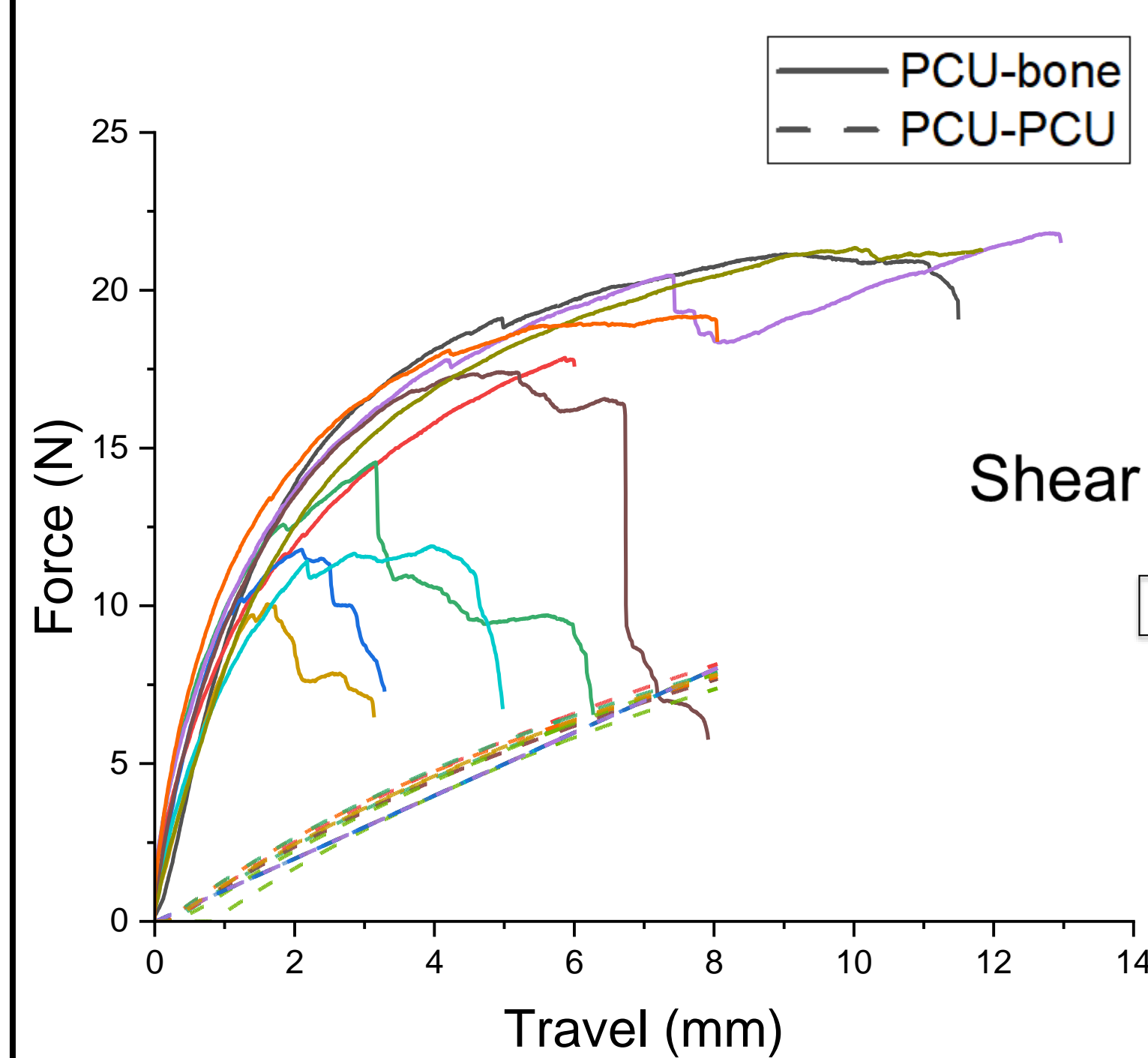
In this study, we evaluated a commercial biocompatible cyanoacrylate-based adhesive Glubran2® (Gem, Italy) as a candidate fixation technique for PCU-based orthopedic implants.

Cyanoacrylate-based adhesives have been reported to demonstrate shear bond strengths in the range of 1-2 MPa in a bone-bone bond [1].

Goal of this study is to measure the shear strength of Glubran2 for attaching PCU film to bone.

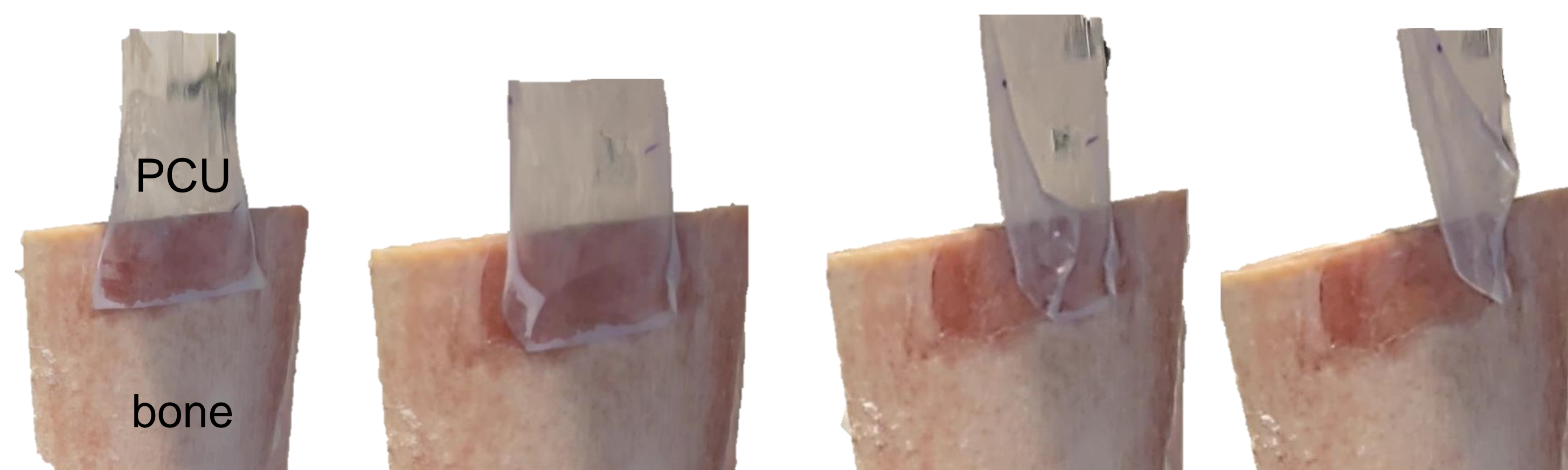
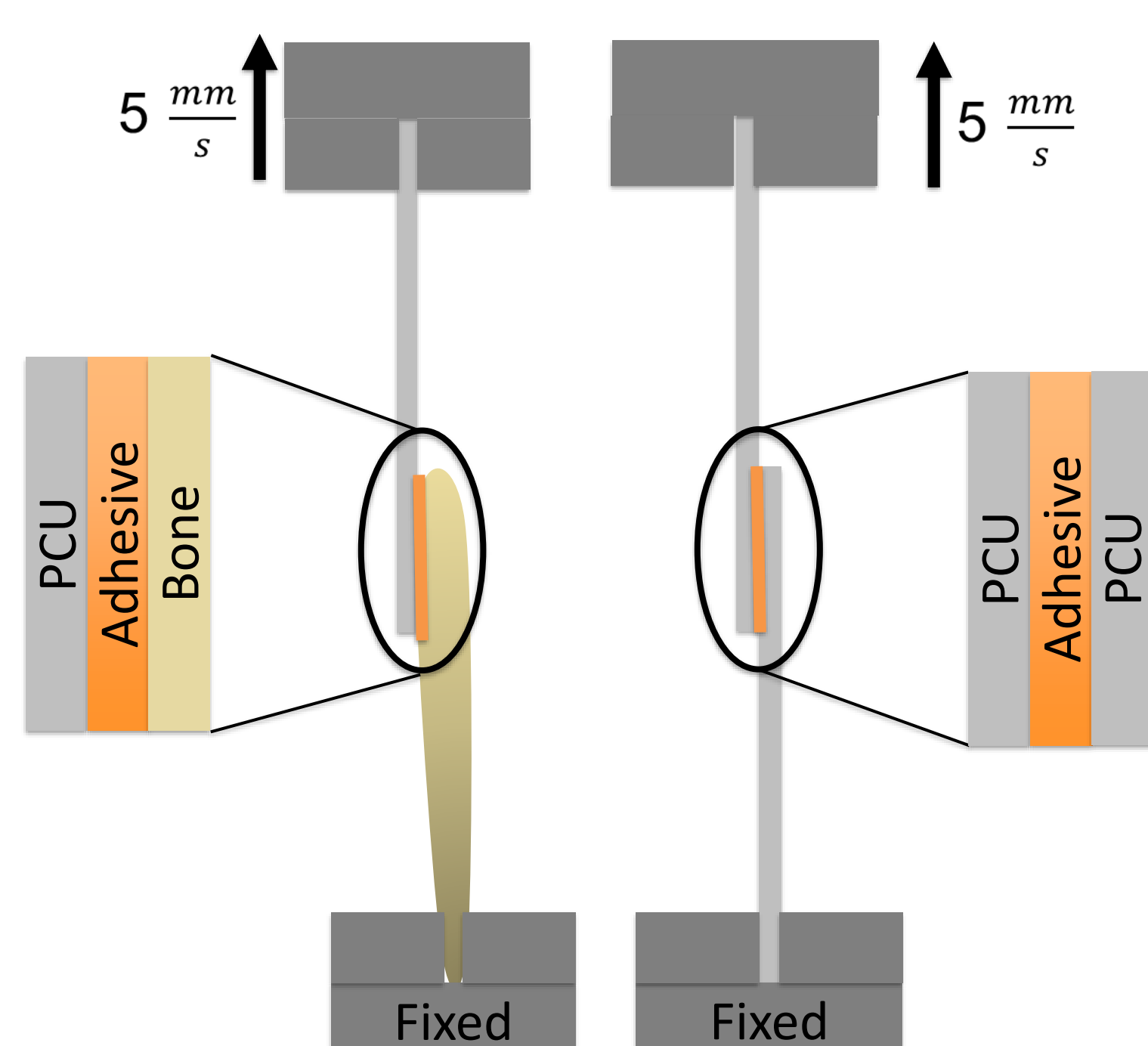
## Results

- The apparent shear strength of Glubran2 adhesive :
  - Bonding PCU film to bovine bone =  $69.3 \pm 13.5$  kPa
  - Bonding PCU film to PCU film =  $38.2 \pm 6.1$  kPa
- Failure did predominantly occur at the bonding site between the Glubran2 adhesive and the PCU film.



## Materials and methods

- lap-shear test (ASTM-F2255)
- 10 samples per group
- Bond area:  $2.5\text{cm} \times 1\text{cm}$
- $\sim 0.1\text{ml}$  of Glubran2 per bond area



Load to failure

## Conclusions

The biocompatible cyanoacrylate-based adhesive showed inferior shear strength in bonding PCU to bone compared to reported strength of bone to bone bonding.

New fixation candidates will be studied for the fixation of PCU-based joint replacement prostheses.

## Literature cited

[1] Borchering K, et al. Current state of bone adhesives-Necessities and hurdles. Vol. 12, Materials. MDPI AG.

## Acknowledgments

This project has received funding from the European Union's Horizon 2020 research and innovation programme under grant agreement No 863183.

