

# Tribological characterization of polyvinyl alcohol hydrogel as substitute of articular cartilage

## OBJETIVE

Demonstrate that under tribological loading mimicking in vivo conditions, PVA hydrogel presents friction and wear characteristics compatible with articular cartilage making it suitable for replacement.

## SAMPLE PREPARATION

Samples were evaluated in hydrated state without any additional process o dehydration.

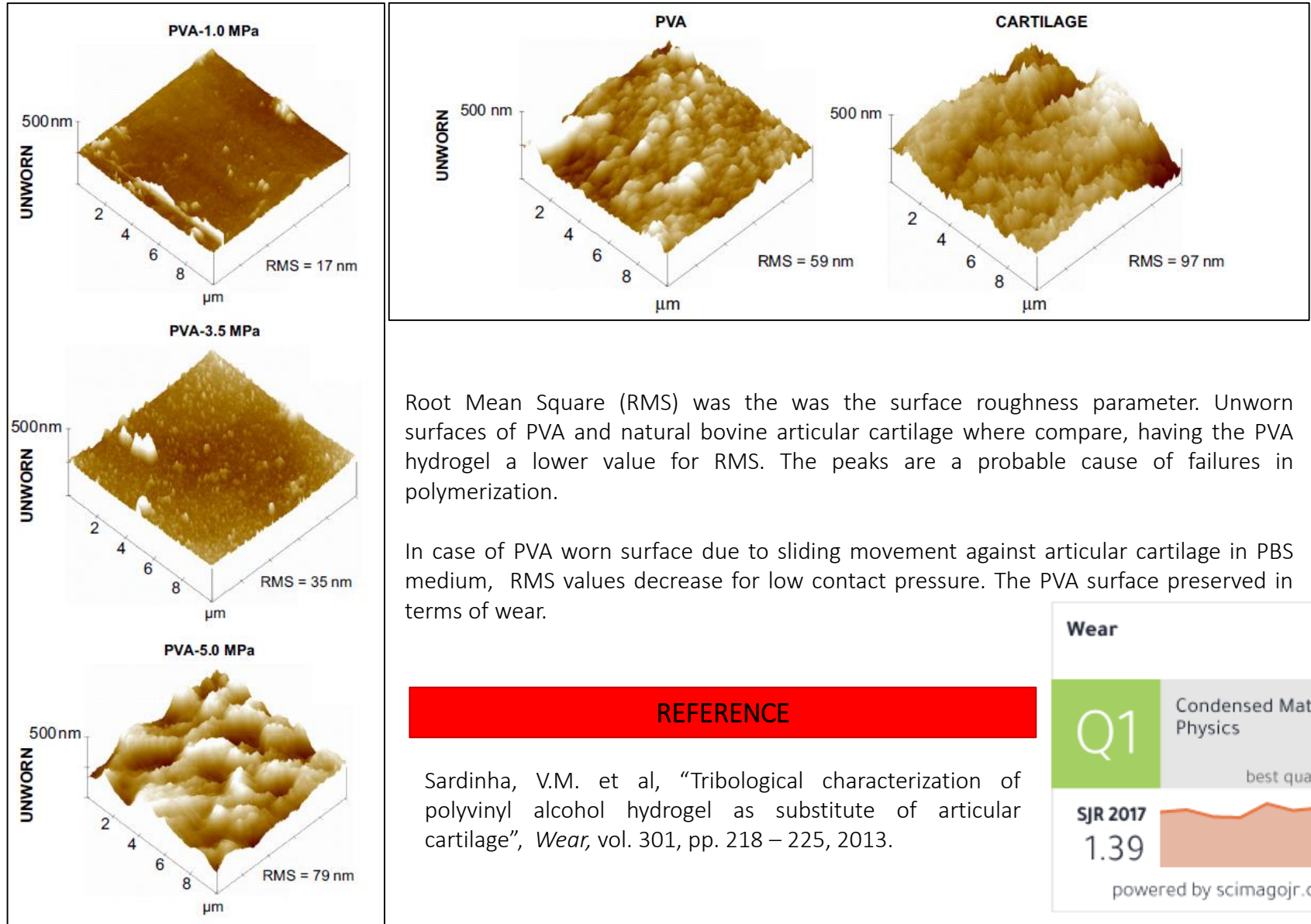
## DATA ACQUISITION

All the AFM examinations were carried out in the same room kept at 24 °C and approximately 50% relative humidity. Observations were conducted in an aqueous environment (distilled water). AFM scans were performed in contact-mode using Si<sub>3</sub>N<sub>4</sub> tips and considering the central area of the wear track. RMS values were obtained over an area of 10x10 μm<sup>2</sup> from roughness analysis.

## CONCLUSION

The frictional response and surface preservation of PVA hydrogel for the different test conditions, as proved by AFM analysis, demonstrates that this hydrogel has high potential to be used as substitute of articular cartilage.

## REPRESENTATIVE FIGURE AND RESULT



Root Mean Square (RMS) was the was the surface roughness parameter. Unworn surfaces of PVA and natural bovine articular cartilage where compare, having the PVA hydrogel a lower value for RMS. The peaks are a probable cause of failures in polymerization.

In case of PVA worn surface due to sliding movement against articular cartilage in PBS medium, RMS values decrease for low contact pressure. The PVA surface preserved in terms of wear.

## REFERENCE

Sardinha, V.M. et al, "Tribological characterization of polyvinyl alcohol hydrogel as substitute of articular cartilage", *Wear*, vol. 301, pp. 218 – 225, 2013.

### Wear

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