# Synergistic effect of polymer molecular weight and Laponite concentration to tune the cell response of synthetic hydrogels

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## INTRODUCTION

Despite being biocompatible, synthetic polymers are often not cell-interactive. By varying the physico-chemical properties of synthetic hydrogels and introducing additives, the cell response can be tuned. Acrylate-endcapped urethane-based poly(ethylene glycol) precursors (AUPs) [1] with a varying backbone molecular weight (2000-8000 g/mol), in combination with the nanoclay Laponite were selected herein. Both backbone MW and Laponite concentration were varied with the aim to tune the mechanical and in vitro cell response of the formed hydrogel networks.

## METHODS

Laponite was introduced into the AUP solution (0.5 or 1 wt%) prior to hydrogel formation. Gel fraction and swelling tests were performed on crosslinked films. Mechanical properties were determined by tensile tests , stress relaxation and rheology. Primary neonatal human dermal fibroblasts were used to perform indirect cytotoxicity tests along with cell adhesion and proliferation assays (using methacrylamide-modified gelatin as positive control) [2].

## RESULTS AND DISCUSSION

High gel fractions close to 100% were obtained. Swelling properties ranged between 4 and 11 gwater/gpolymer with only a small significant reduction upon addition of Laponite. An increase in backbone MW induced a decrease in the storage modulus (from 58 down to 20 kPa). Young's moduli ranged between 0.1 and 0.6 MPa. The addition of Laponite influenced the modulus due to the distribution of nanoparticles as well as shear thinning behavior [3, 4]. Finally, no cytotoxicity was observed. Laponite led to a substantial increase of both cell adhesion and proliferation, but only at a low MW backbone (2000 g/mol), thereby demonstrating the tunability of the cell-adhesion properties, confirmed by fluorescence microscopy.

## CONCLUSION

Addition of Laponite and variation of the MW of the AUP backbone resulted in a synergistic effect on the cell-adhesive properties. This creates opportunities for non-adherent biomedical applications such as wound dressings or cell adherent applications including tissue engineering scaffolds.

## REFERENCES

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## ACKNOWLEDGMENTS

This project has received funding from the Interreg 2 Seas programme 2014-2020 co-funded by the European Regional Development Fund under subsidy contract No 2S01-027 and additionally from the Research Foundation Flanders (No. 12Z2918N)