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Synthesis and characterization of alginic acid scaffolds with possible tissue regeneration applications

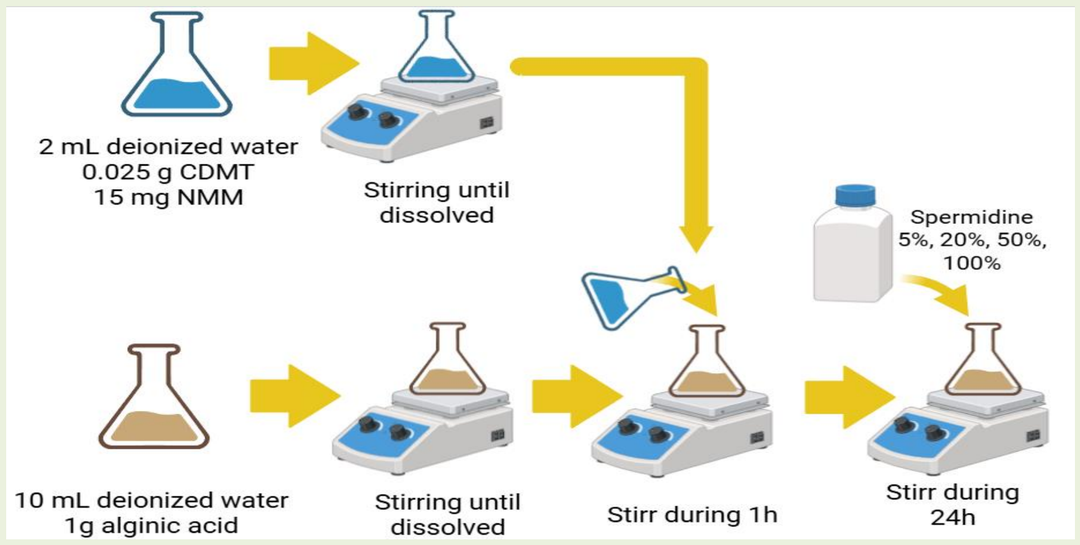
Díaz Corte Harim Galilea [1] , Martínez Mejía Gabriela[2] , De la Luz Corea Monica[2] & Padilla Itzia Irene[1]

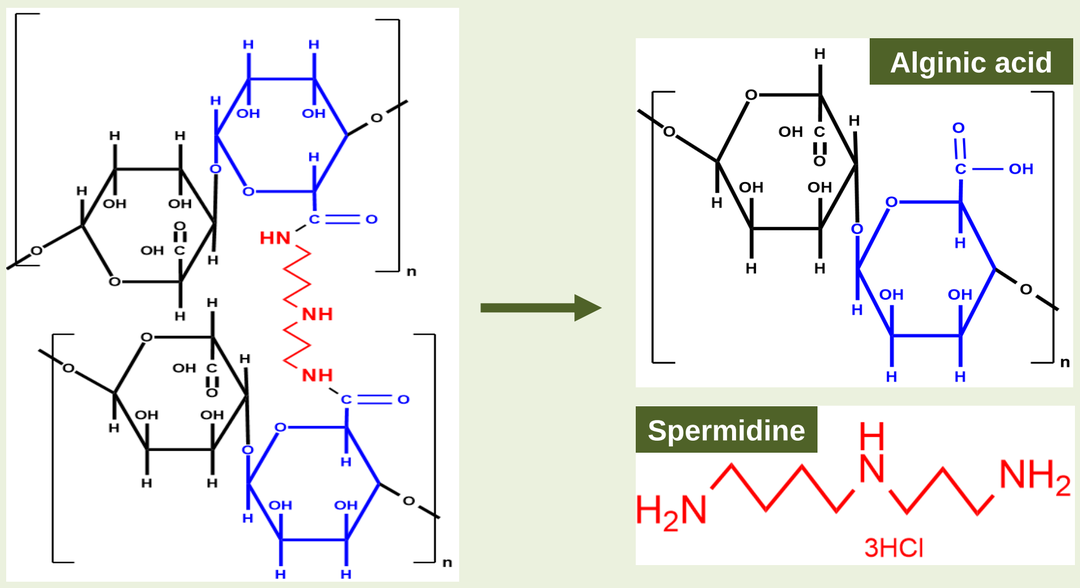
[1]UNIDAD PROFESIONAL INTERDISCIPLINARIA DE BIOTECNOLOGÍA [2]ESCUELA SUPERIOR DE INGENIERÍA QUÍMICA E INDUSTRIAS EXTRACTIVAS

INTRODUCTION & AIM

Organ and tissue transplant demand is a worldwide problem due to the limited availability of donors, for this reason, there is an urge to create new biomaterials that could help reduce the demand and improve patient healing process. One kind of biomaterials that has shown promising results are the hydrogels, 3D networks of hydrophilic crosslinked biopolymers, due to their high-water retention capacity, biodegradability and biocompatibility properties[1], ideal to be used as scaffolds for tissue regeneration. Past works pointed out that modified alginate hydrogels could be used to repair muscle tissue[2]. Therefore, we synthesized alginic acid hydrogels chemically crosslinked with spermidine, an organic molecule present in elevated concentration within proliferating animal tissue[3], for skin fibroblast renewal.

METHOD





Characterization
Scanning electron microscopy
Spectroscopic techniques
Rheological analysis
Cytotoxicity assay

RESULTS & DISCUSSION

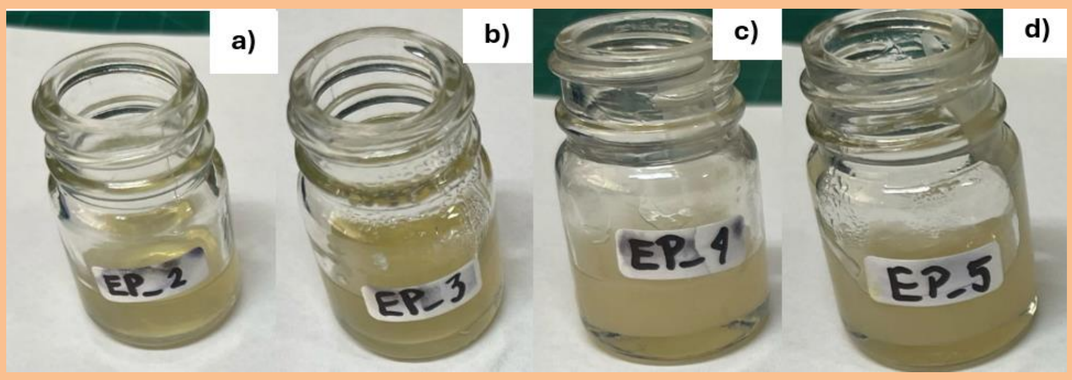


Figure 1: Hydrogels synthetized at different concentrations of spermidine a) 5% (w/w) b) 20% (w/w) c) 50% (w/w) d) 100% (w/w)

RESULTS & DISCUSSION

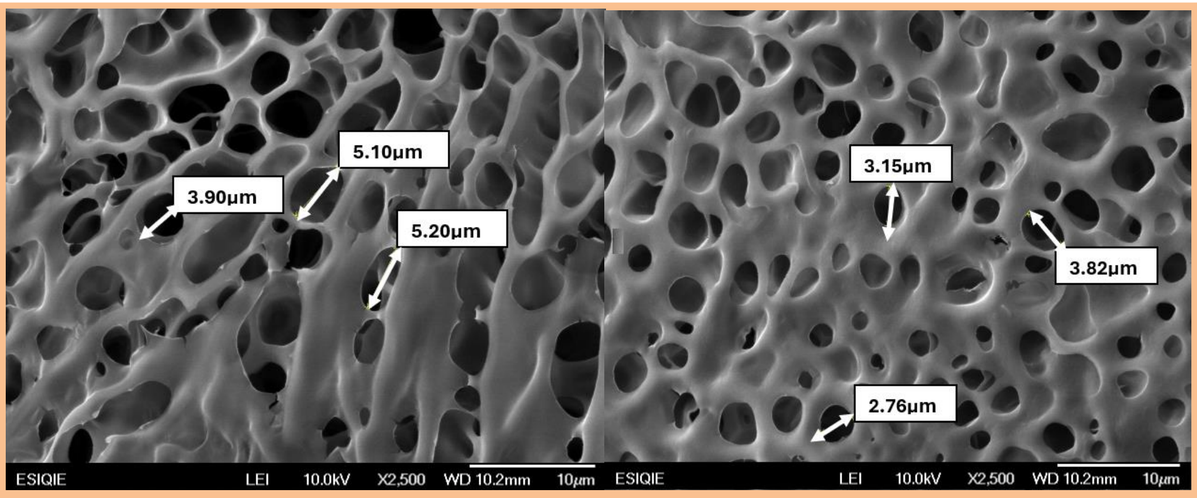


Figure 2: Scanning electron microscopy results of 5% (w/w) spermidine hydrogels pore size

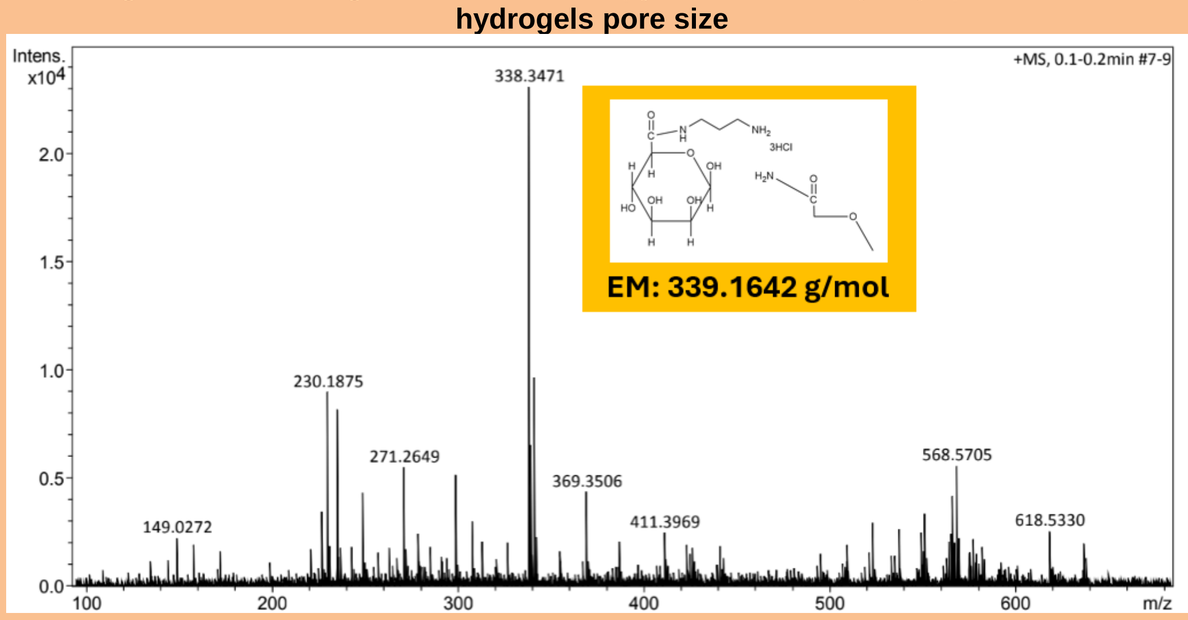


Figure 3: ESI-mass results with experimental mass (EM) and structure of spermidine hydrogels

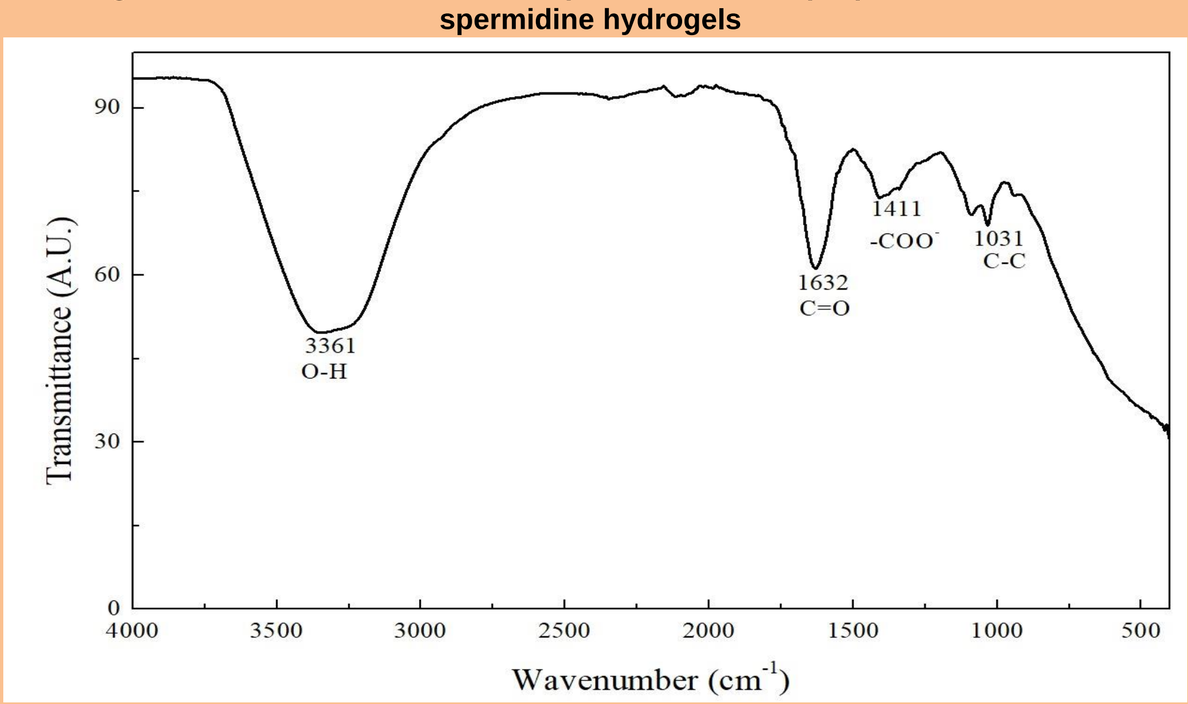


Figure 4: 5% (w/w) spermidine hydrogels FT-IR results with each functional group and wavenumber

CONCLUSION

Novel alginic acid hydrogels were synthetized by chemical crosslinking with spermidine. Characterization techniques revealed an 5.34 µm hydrogel average pore size, ESI-mass analysis showed expected bonding between alginic acid and spermidine. Finally, some hydrogel's functional groups are presented in FT-IR spectrum.
Cytotoxicity test are currently being developed.

FUTURE WORK / REFERENCES

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