Hydrogels-based systems for the controlled release of therapeutic agents: an innovative treatment for osteoarthritis

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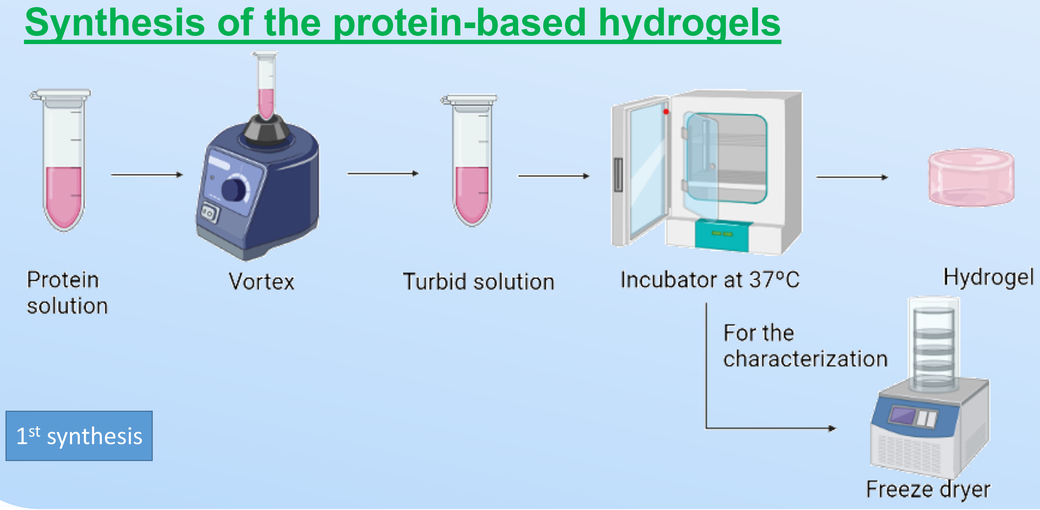
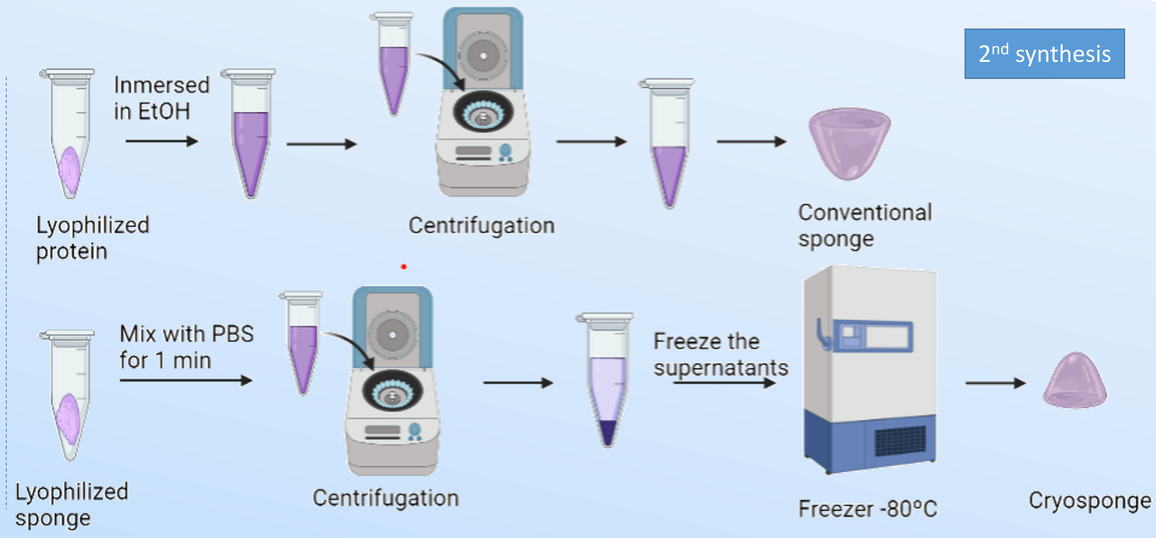
Osteoarthritis is a degenerative disease that affects the bones, joints and ligaments, resulting in a degradation of joint cartilage over time, as well as inflammation stiffness. To mitigate the pain caused by this disease, non-steroidal anti-inflammatory drugs (NSAIDs) or painkillers are widely used. However, they have several adverse effects as ulcers or liver damage[1].

Therefore, the **aim of this work** is the development of an encapsulation systems for medicines using protein-based hydrogels. A **hydrogel** is a network of water-rich 3D polymers formed by physical or chemical crosslinking of polymers, which can be used as a support system for other molecules or structures[2,3].

The final material is **characterized** using Scanning Electron Microscopy (**SEM**), Fourier Transform Infrared Spectroscopy (**FTIR**) and **UV-Vis spectroscopy**.

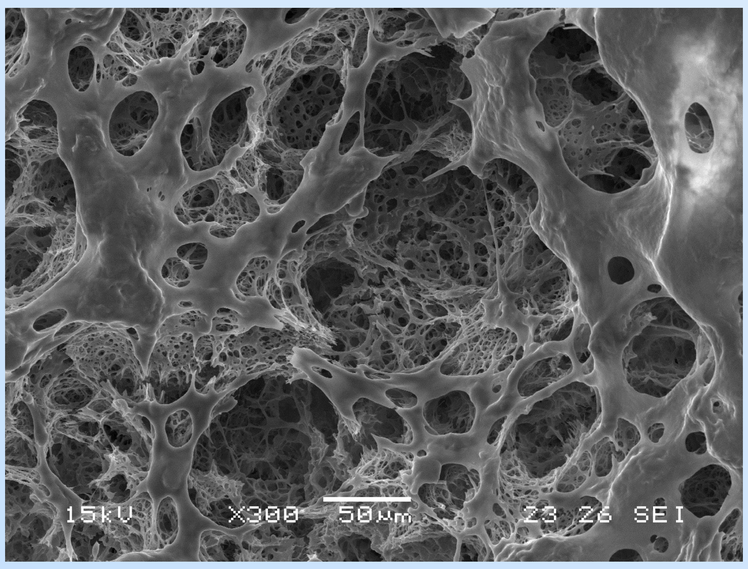
Synthesis of the protein-based hydrogels

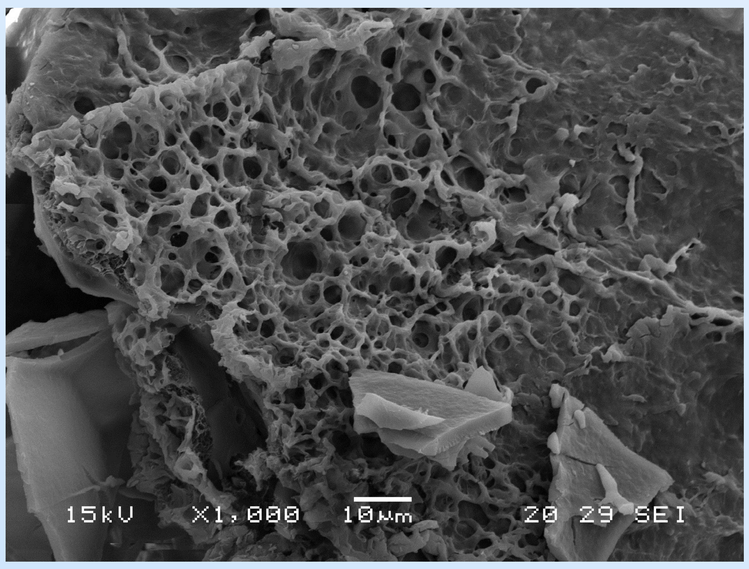


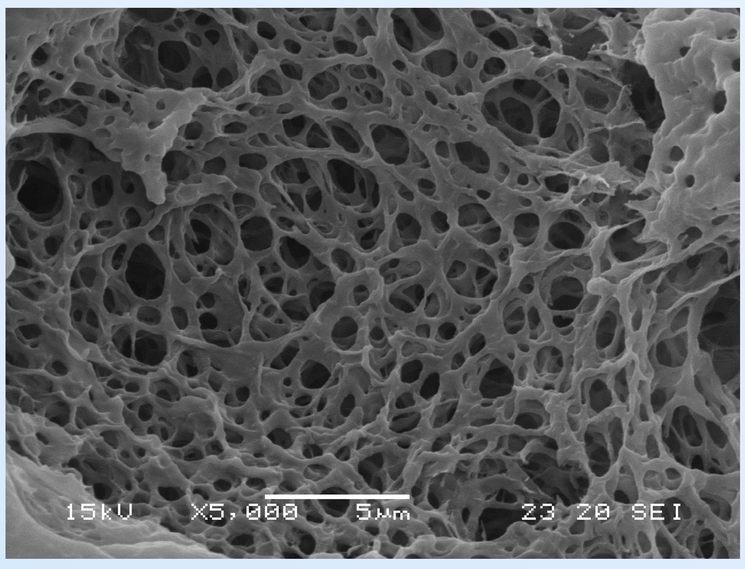


Hydrogels Characterization

SEM

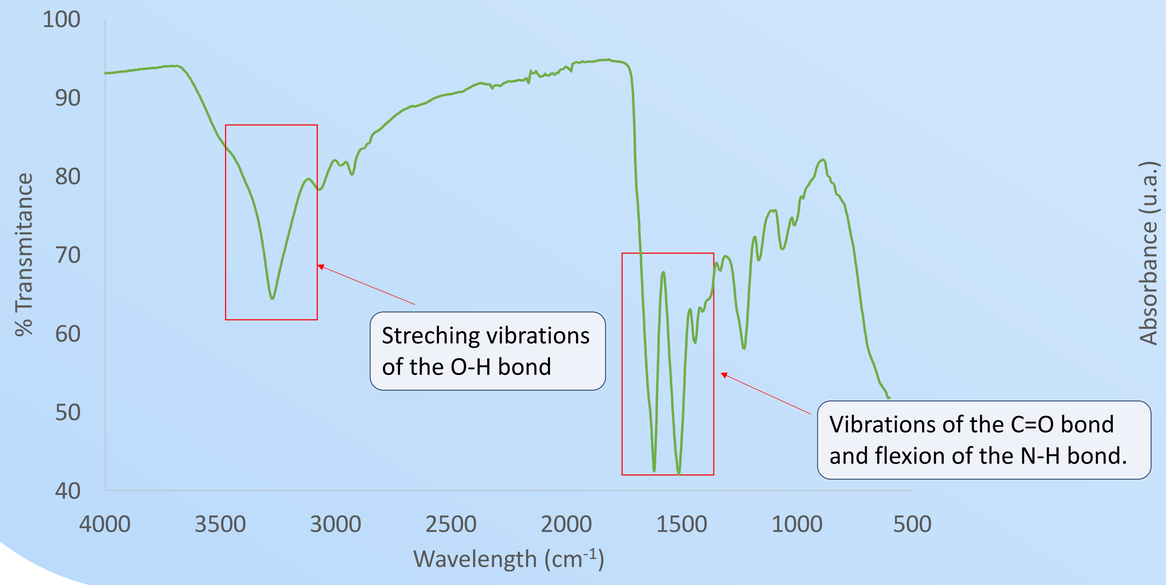




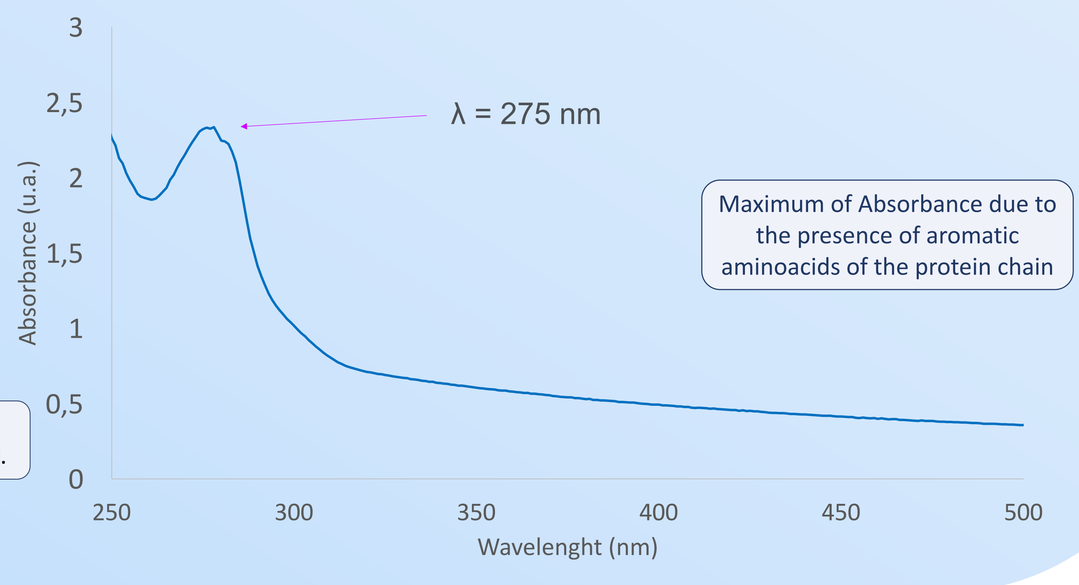


Pore size of the hydrogels varies between 200 nm to 10 µm.

FT-IR Spectra



UV-Vis spectra



Conclusions

- The different synthesis done were successfully fulfilled even though it is required several days to do them.
- The hydrogels prepared have a relatively good stability considering that they remain intact since one month of their preparation and they can also be stored at room temperature
- As the hydrogels present a good porosity, the next approach will be the encapsulation of pharmaceuticals, followed by their controlled release for the treatment of osteoarthritis.

References

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3. Hunt, N.C., Grover, L.M. Cell encapsulation using biopolymer gels for regenerative medicine. Biotechnol Lett 32, 733–742 (2010).

Acknowledgements

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