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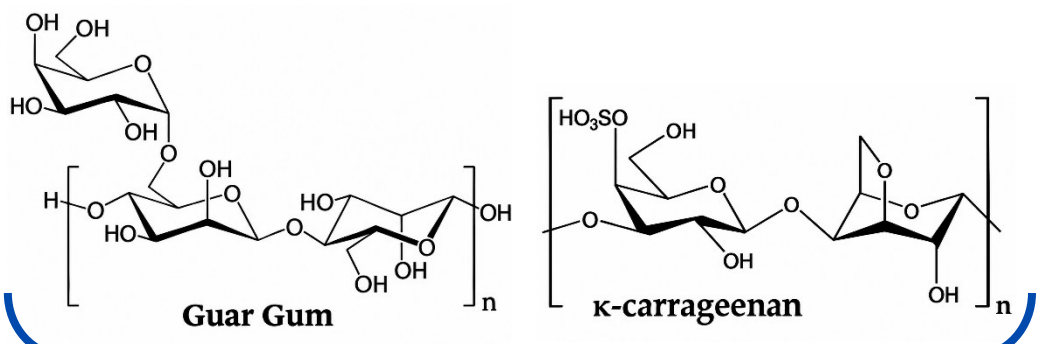
Development and Characterization of k-Carrageenan/Guar Gum–Hydroxyapatite Composite Hydrogels for Bone Tissue Engineering

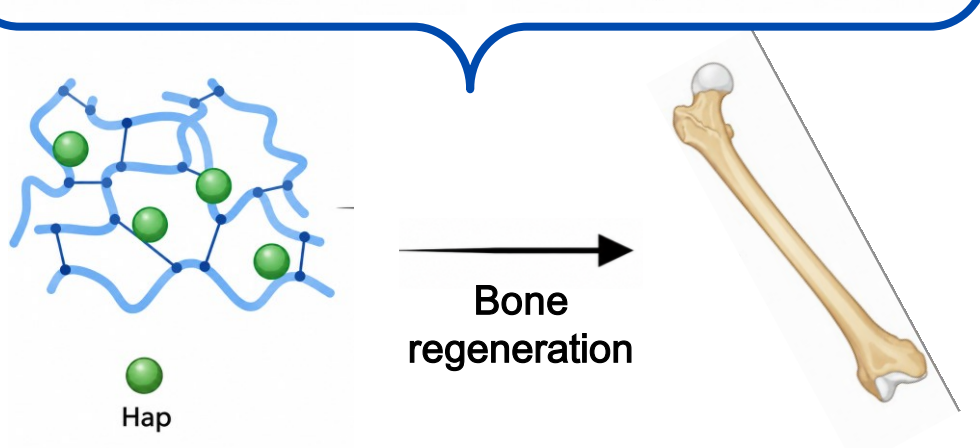
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Introduction

The combination of **k-carrageenan (KC)** and **galactomannans (GAs)** has attracted significant attention due to the **synergistic interactions** between these polysaccharides [1], enabling the design of **structured polymeric networks** with tunable properties [2].





Hydrogel cross-linked with **epichlorohydrin (EPH)** [3], for release of **Hydroxyapatite (Hap)** **synthesized** in **previous studies** [4]

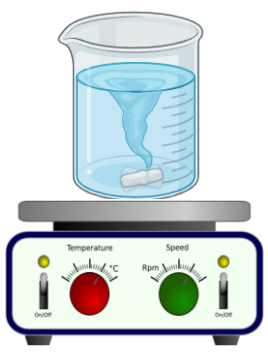
Methodology

Preparation of films by solvent evaporation technique

1% (v/v) of 0.2 mol·L⁻¹ $CaCl_2$

Hap

Chemical Crosslinking with EPH



Previously synthesized and characterized



75:25% GG:KC (w/w)
At 1% (w/v) in water

0%, 2.5%, 5%, and 10% Hap relative to the total polymer mass

Solvent evaporation 40°C ↑ Δ



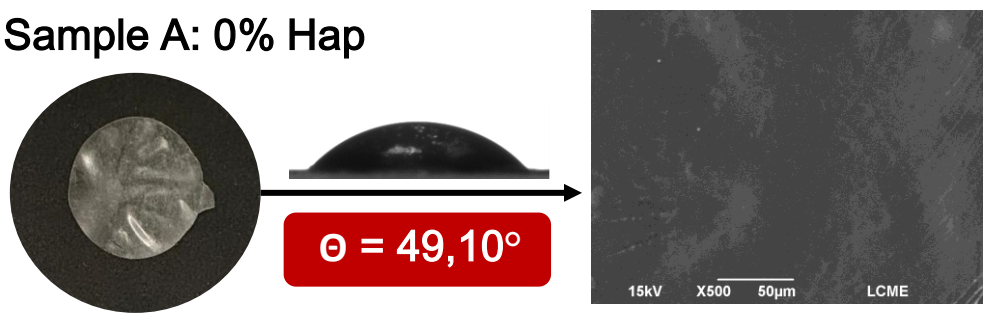
Characterization

- X-Ray Diffraction (**XRD**)
- Scanning Electron Microscopy (**SEM**)
- **Contact angle** and wettability
- **24h Cell viability assay** with **MC3T3 pre-osteoblasts** (murine calvaria)

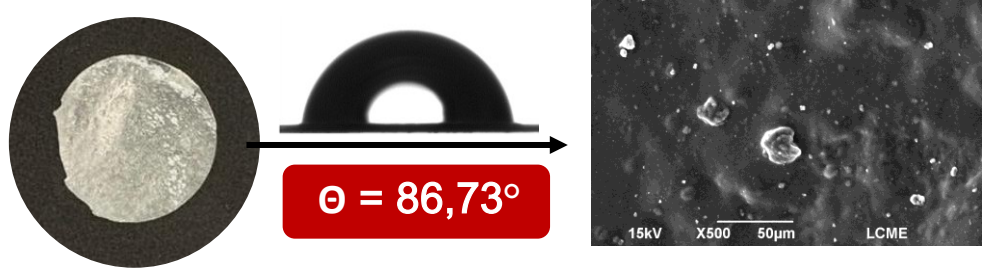
Results and Discussion

Morfology Contact Angle and Wettability

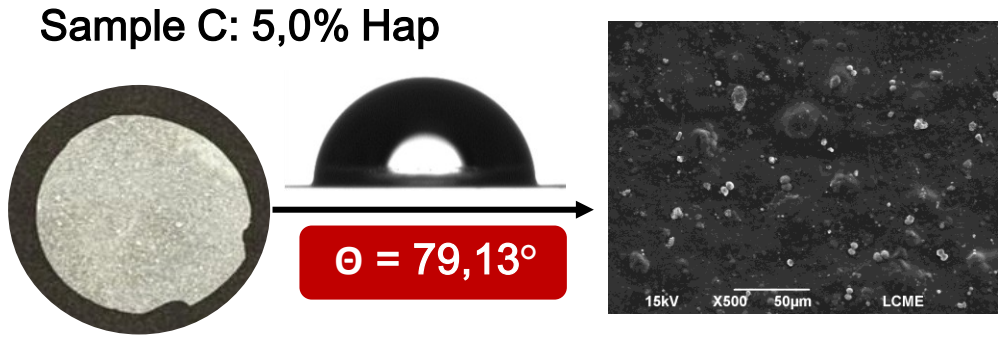
Sample A: 0% Hap



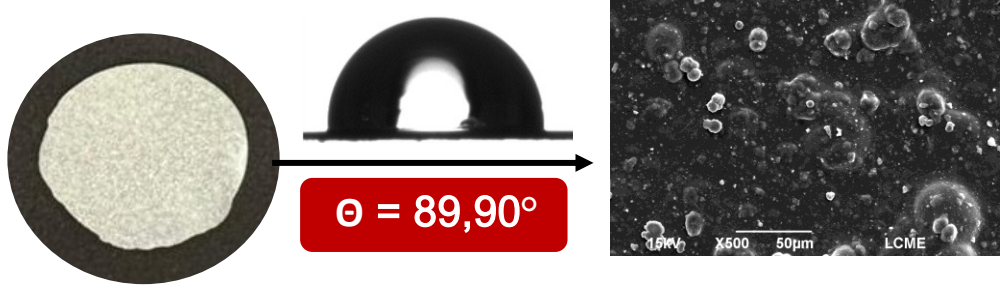
Sample B: 2,5% Hap



Sample C: 5,0% Hap

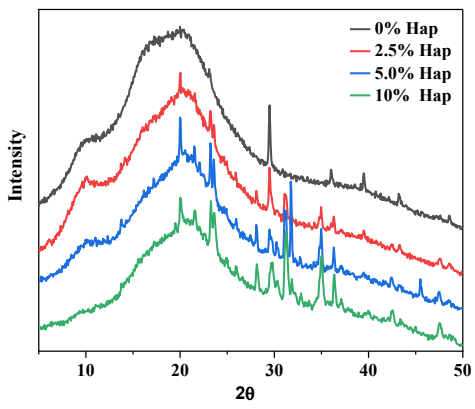


Sample D: 10% Hap

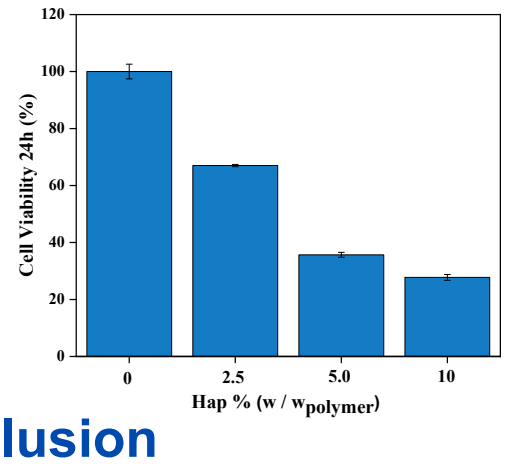


- **Higher HAP content increased crystallinity**, corroborated by XRD.
- **Low cytotoxicity was observed at lower HAP concentrations** in MC3T3 pre-osteoblasts.

XRD Diffraction



24h Cell Viability Assay



Conclusion

The composite hydrogel shows **tunable properties and potential for bone regeneration**. However, **Hap concentration optimization is essential** for balancing material properties and biocompatibility.

References and Aknowledgements

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