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Antimicrobial and cell-adhesive peptide-based hydrogels for biomedical applications

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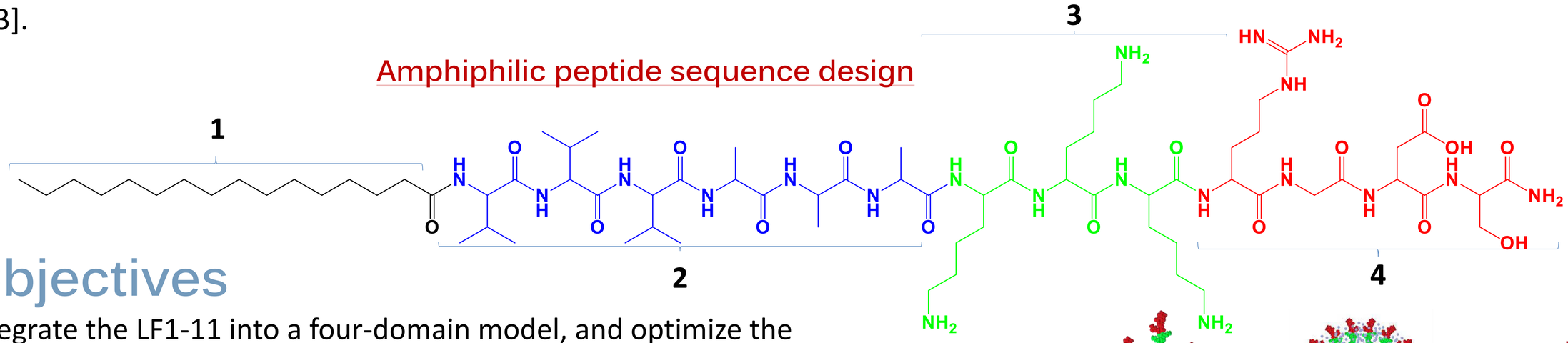
Background

In the ever-evolving landscape of biomaterials, the demand for multifunctional hydrogels has intensified due to their pivotal role in addressing simultaneous challenges associated with bacterial infections and inadequate cell adhesion in various biomedical applications [1-3].

Amphiphilic peptide sequence design

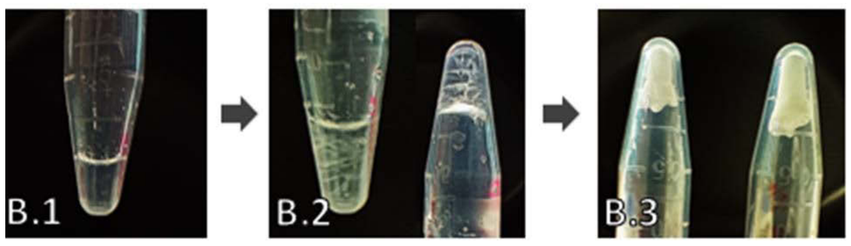


Objectives

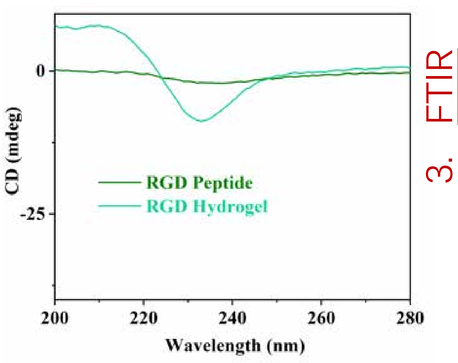
- Integrate the LF1-11 into a four-domain model, and optimize the gelation of as prepared peptides.
- Design peptide-based hydrogels with cell-instructive properties.
- Incorporate antibacterial peptides to reduce bacterial viability.

Results and discussion

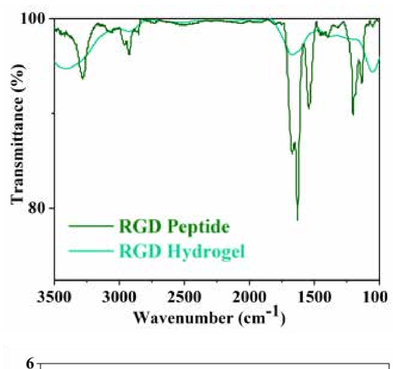
1. Generation of the hydrogels



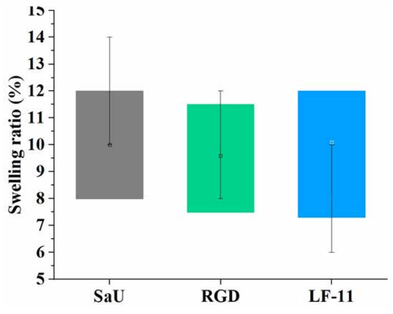
2. CD



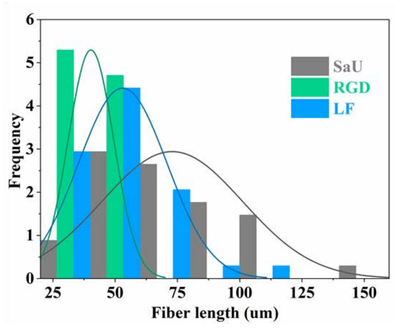
3. FTIR



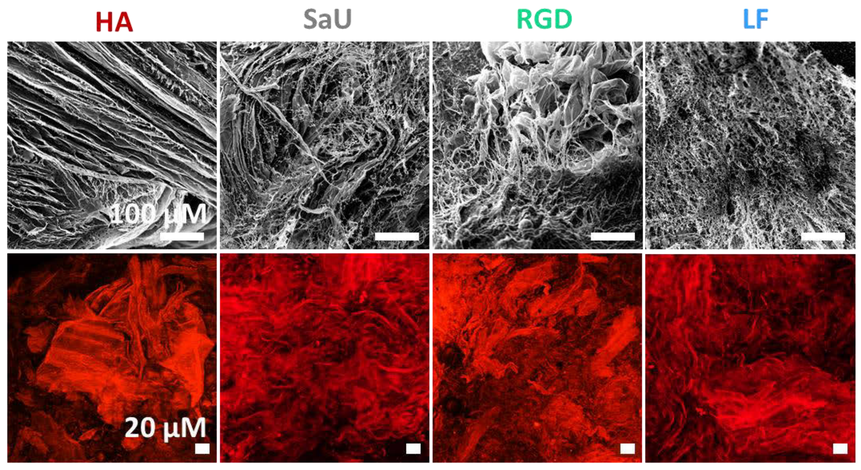
4. Swelling



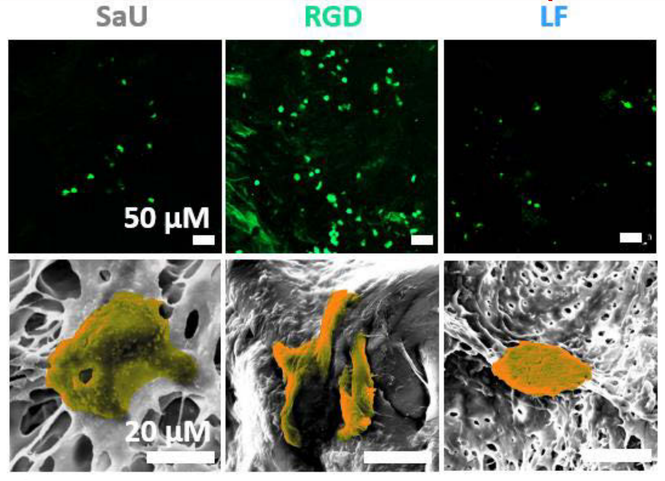
5. Fiber length



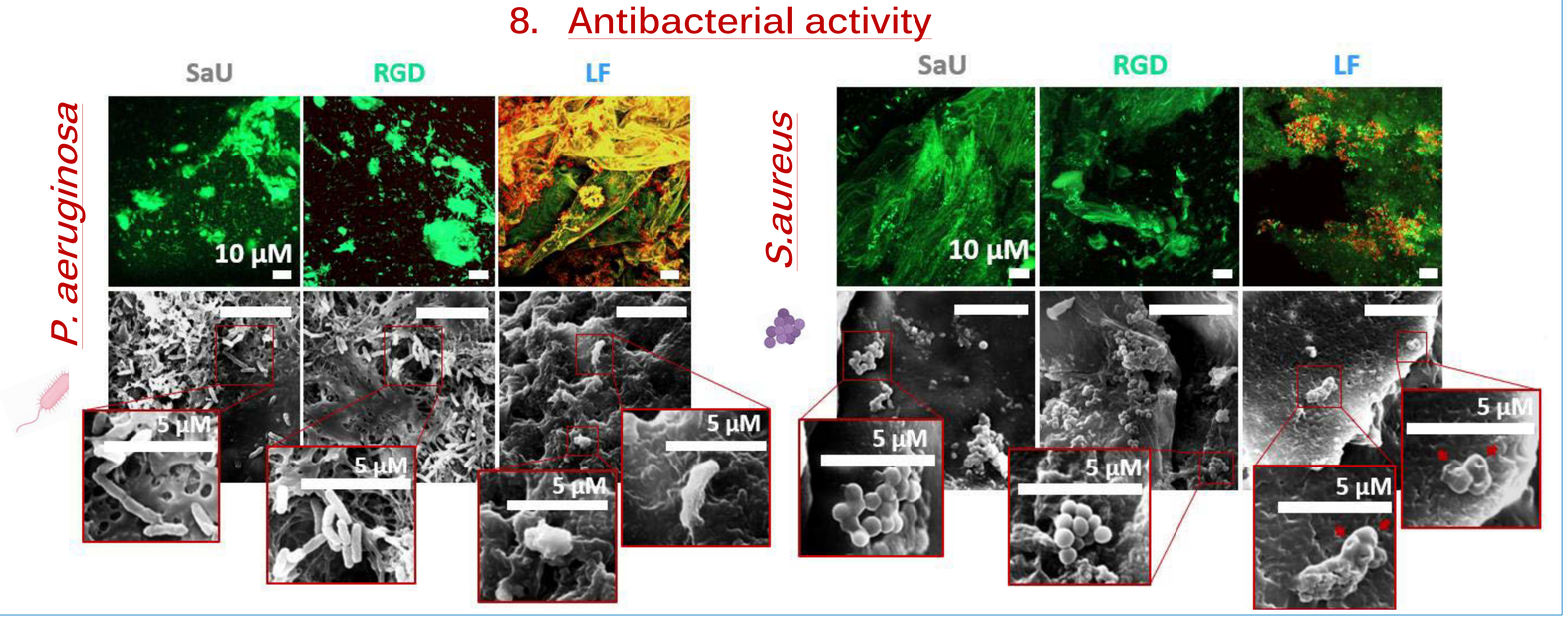
6. Morphology of the hydrogels



7. Human osteosarcoma cell line (Saos-2)



8. Antibacterial activity



Conclusions

Developed peptide-derived hydrogels support excellent Saos-2 viability and reduce the risk of bacterial infection for both Gram-positive and Gram-negative models. The study successfully integrated LF1-11 into a four-domain peptide model for the first time, highlighting the potential for tailored hydrogels with diverse bioactivities.

References

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2. Hoyos et al, ACS applied materials & interfaces, 2017, 9(26), 21618–21630.
3. Godoy et al, Biomacromolecules. 2015;16(2):483-496.

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