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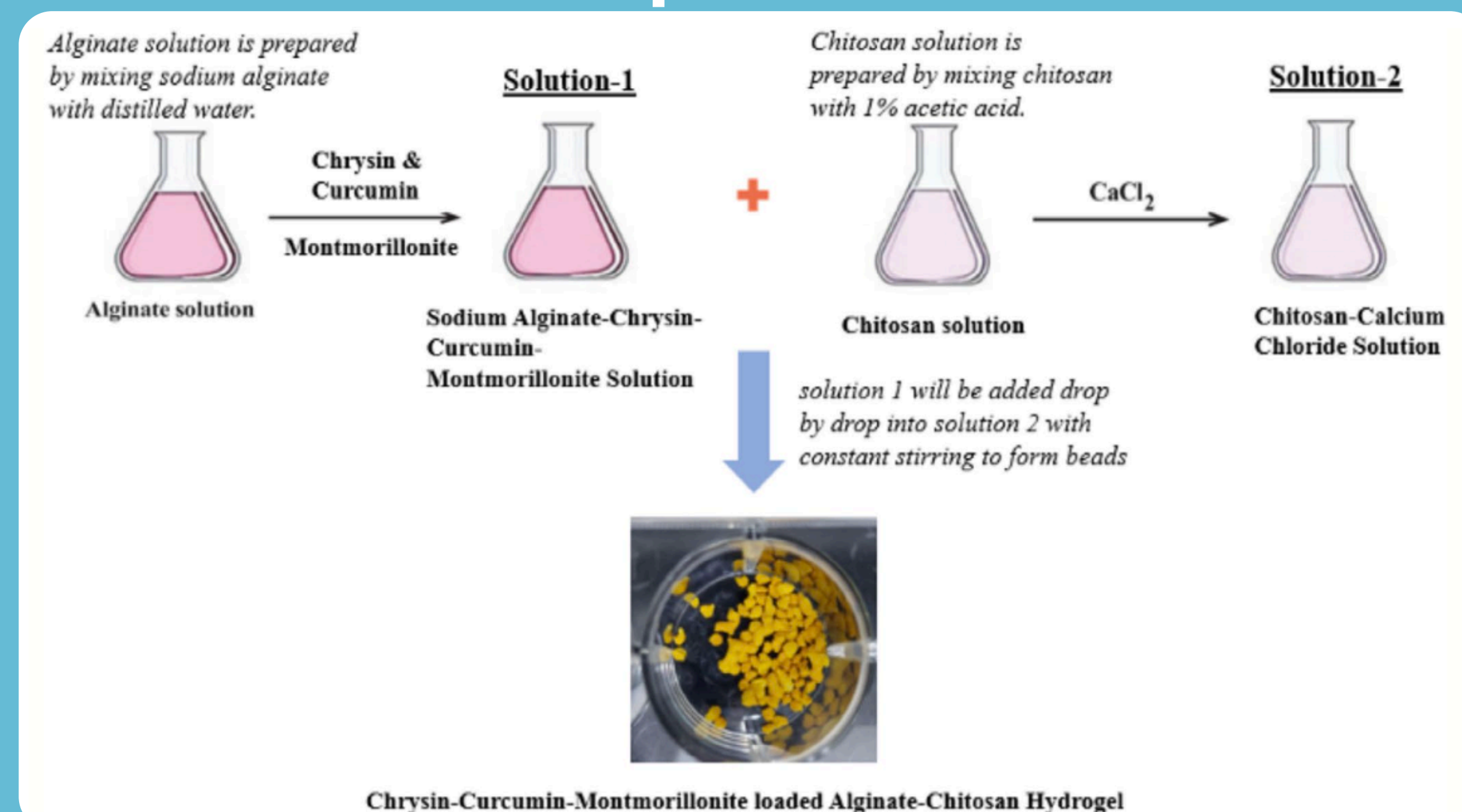
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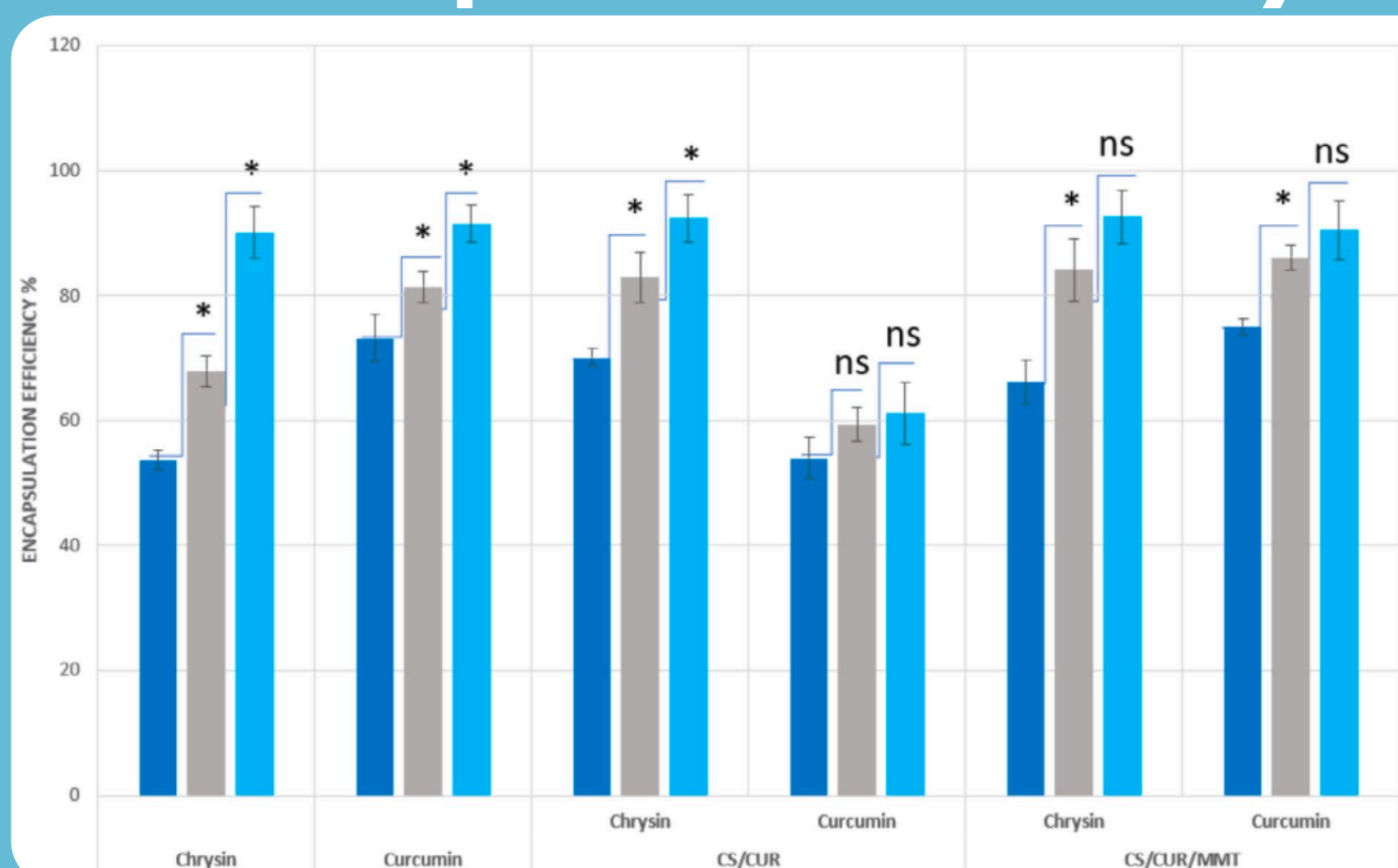
Introduction

- Chronic wounds (e.g., diabetic ulcers) remain a major healthcare challenge, needing dressings that accelerate healing and prevent infection.
- Hydrogels (alginate, chitosan) offer moisture retention, biocompatibility, and drug-delivery capability, but have weak mechanics and limited antimicrobial activity.
- Curcumin & Chrysin: natural bioactives with anti-inflammatory and antibacterial properties.
- Montmorillonite (MMT): improves stability, drug entrapment, and controlled release.
- This study: Developed a multifunctional alginate-chitosan hydrogel incorporating curcumin, chrysin, and MMT for enhanced wound healing, infection control, and sustained drug delivery.

Preparation

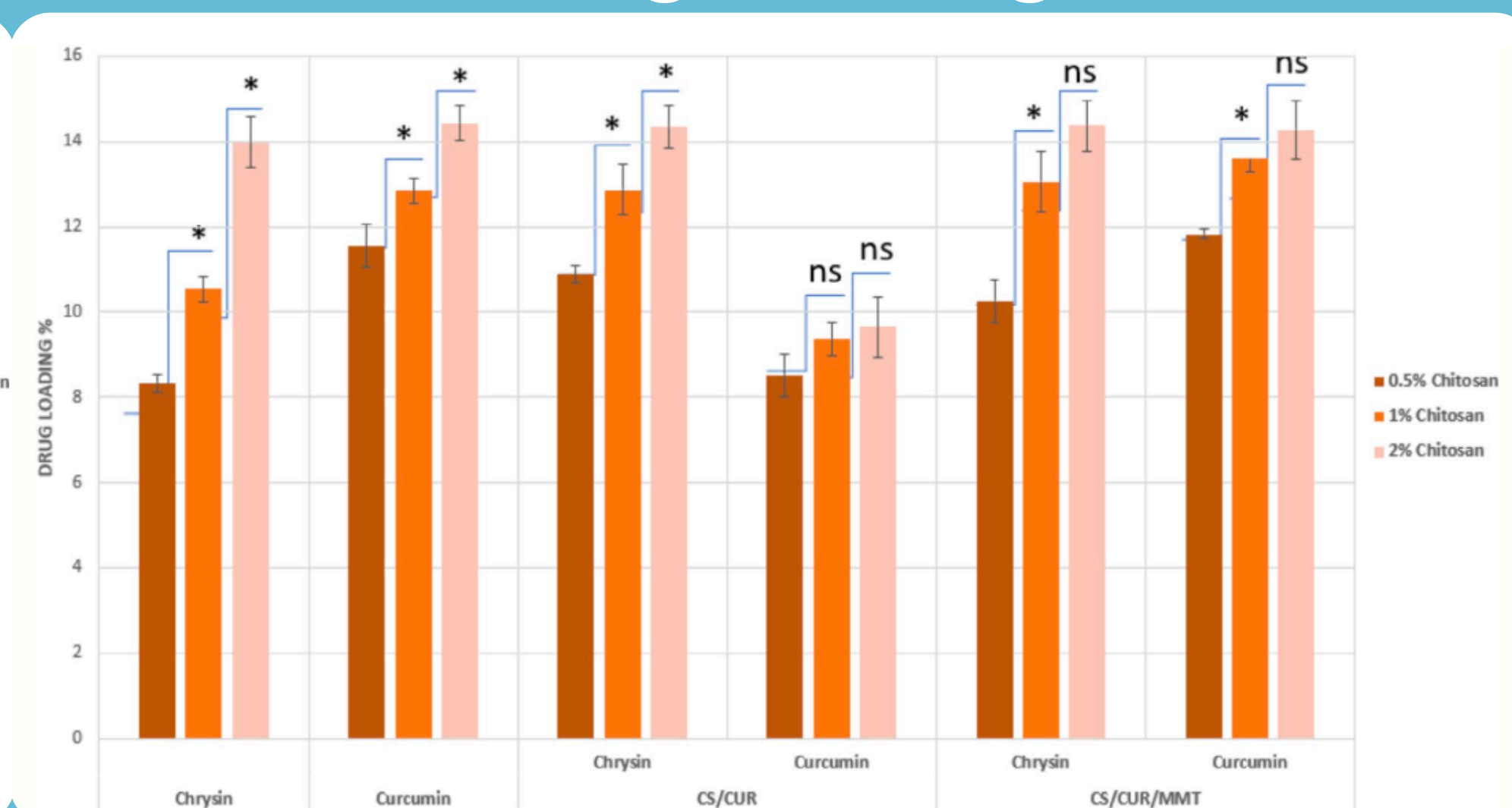


Encapsulation Efficiency

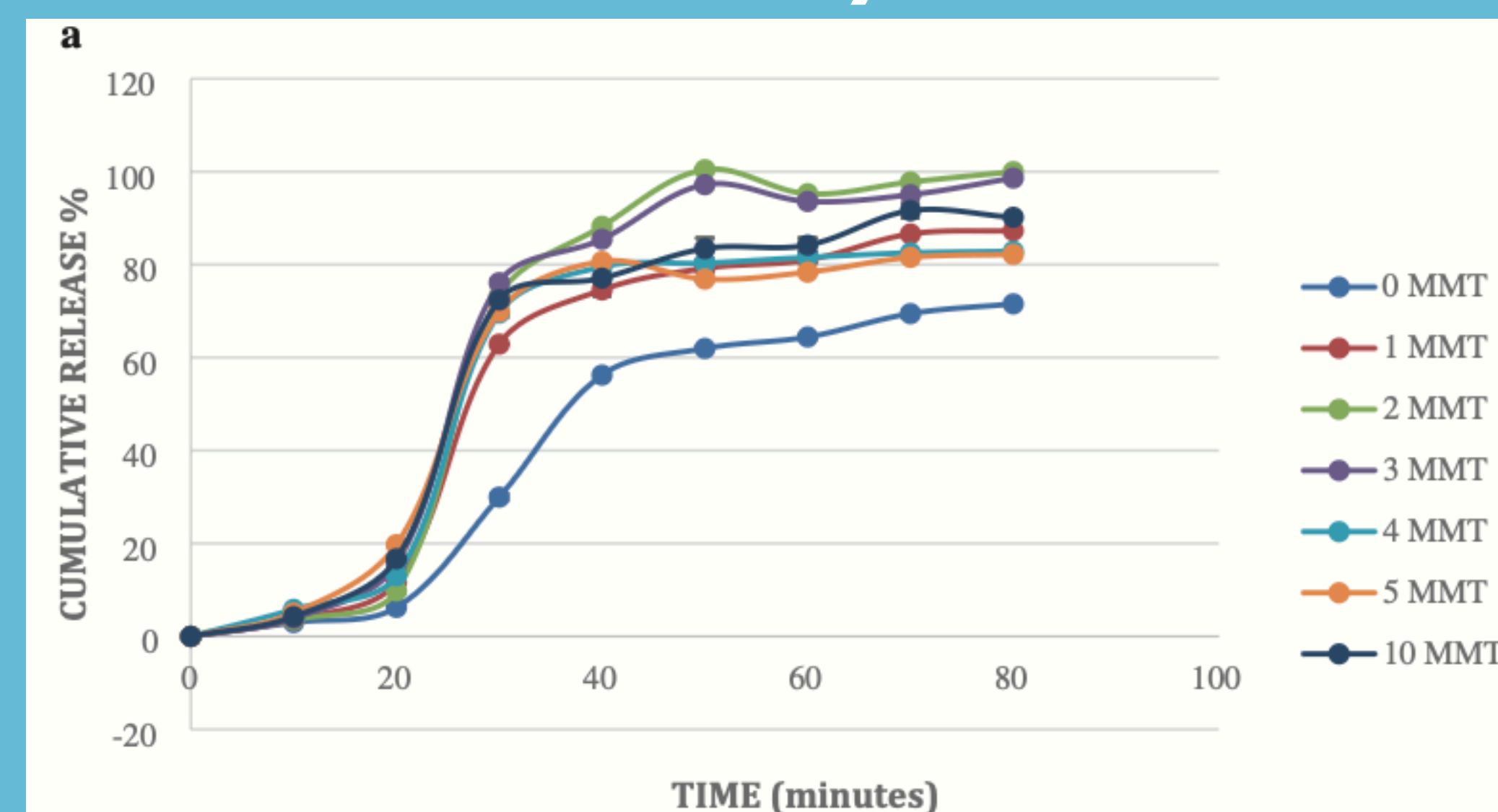


Results

Drug Loading

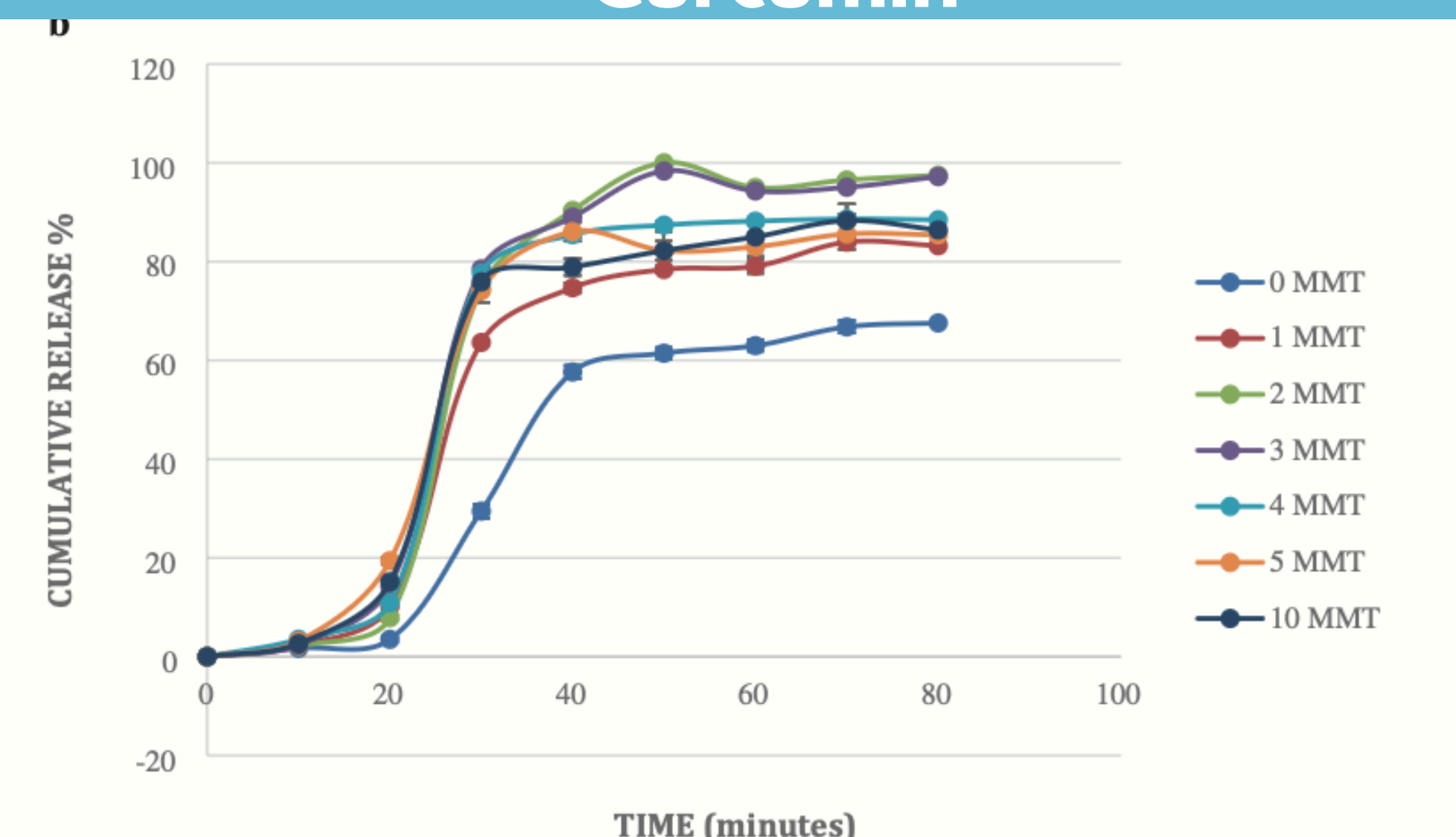


Chrysin

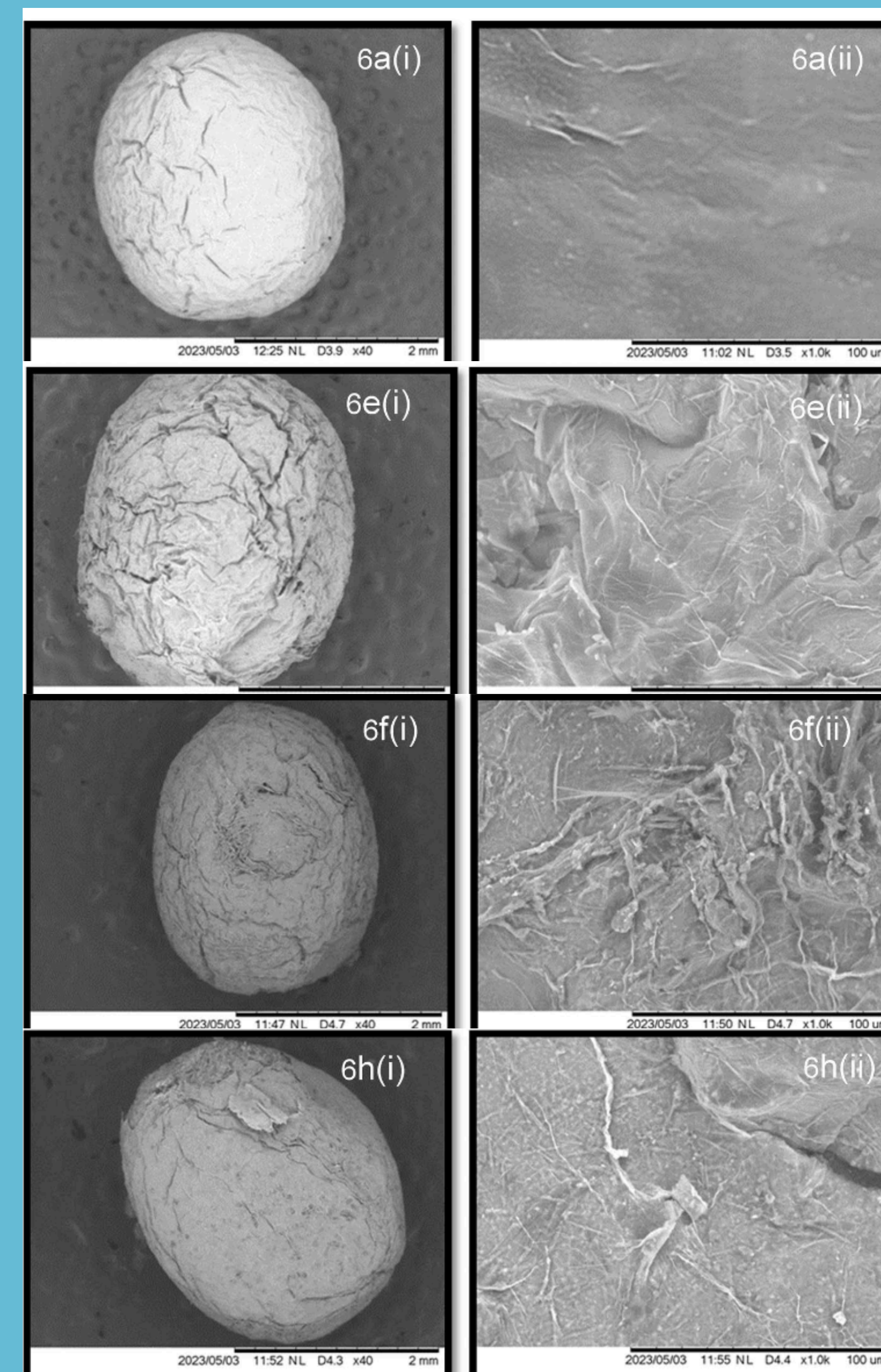


Drug Release

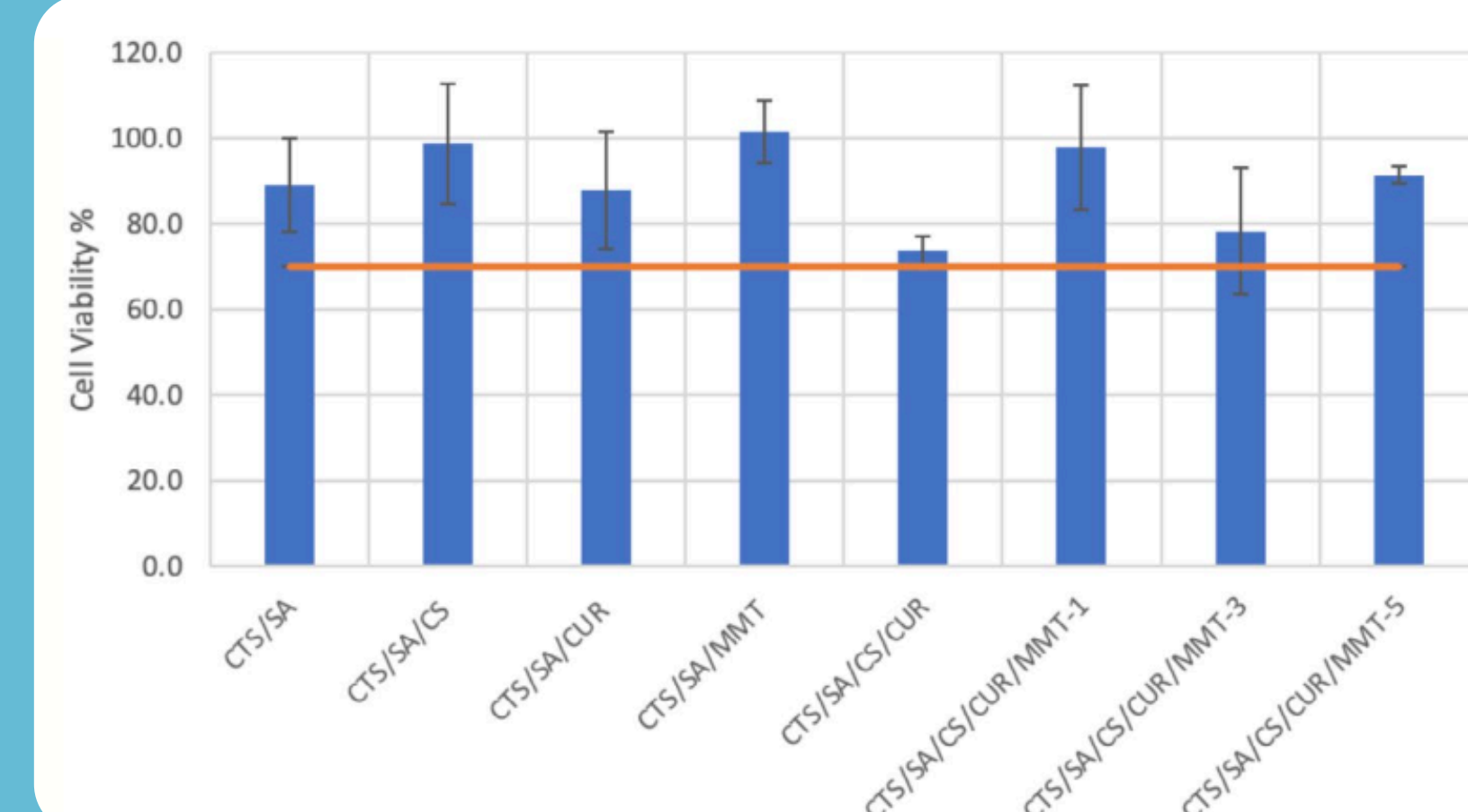
Curcumin



Final Samples



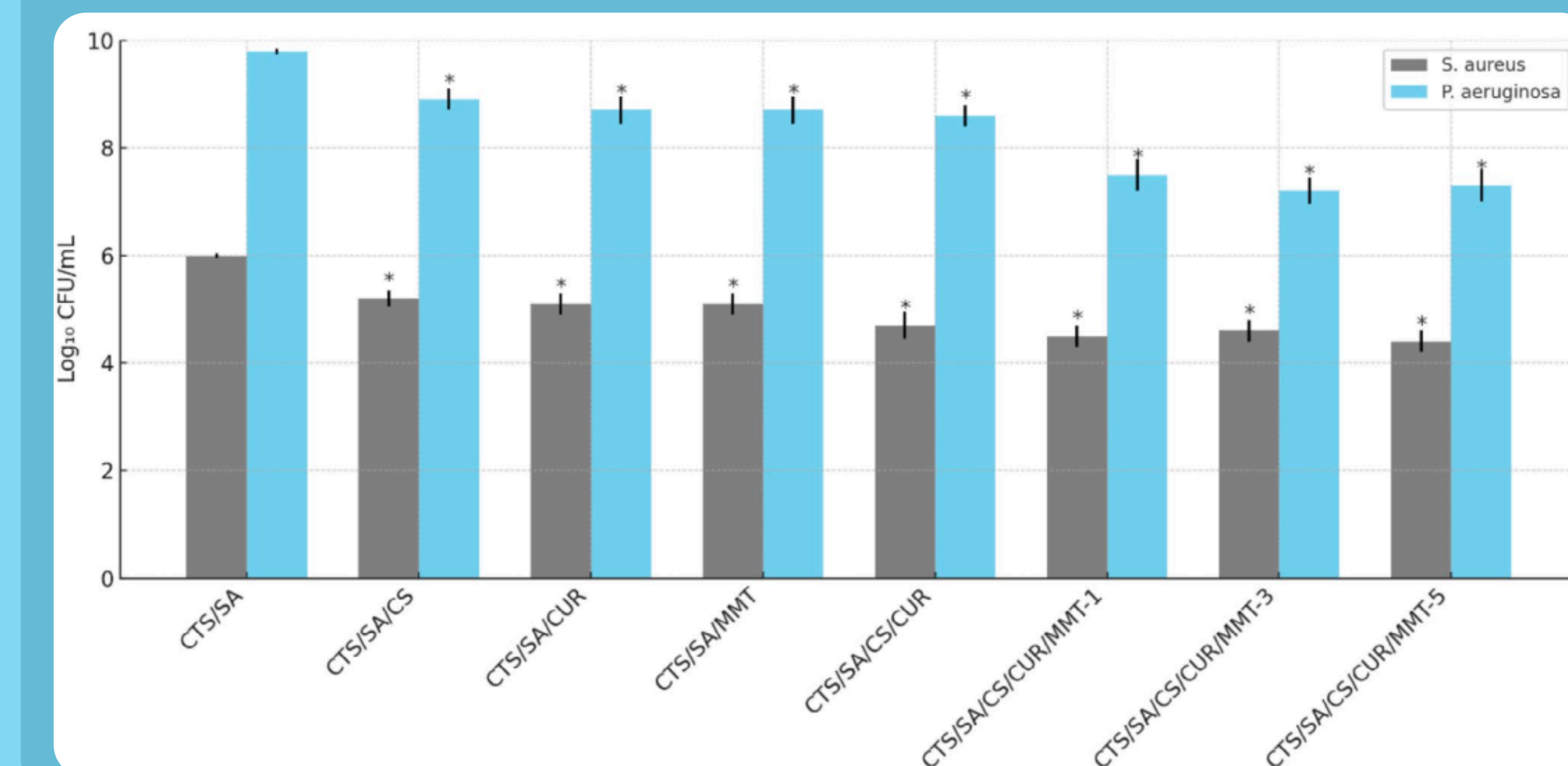
Cell Viability



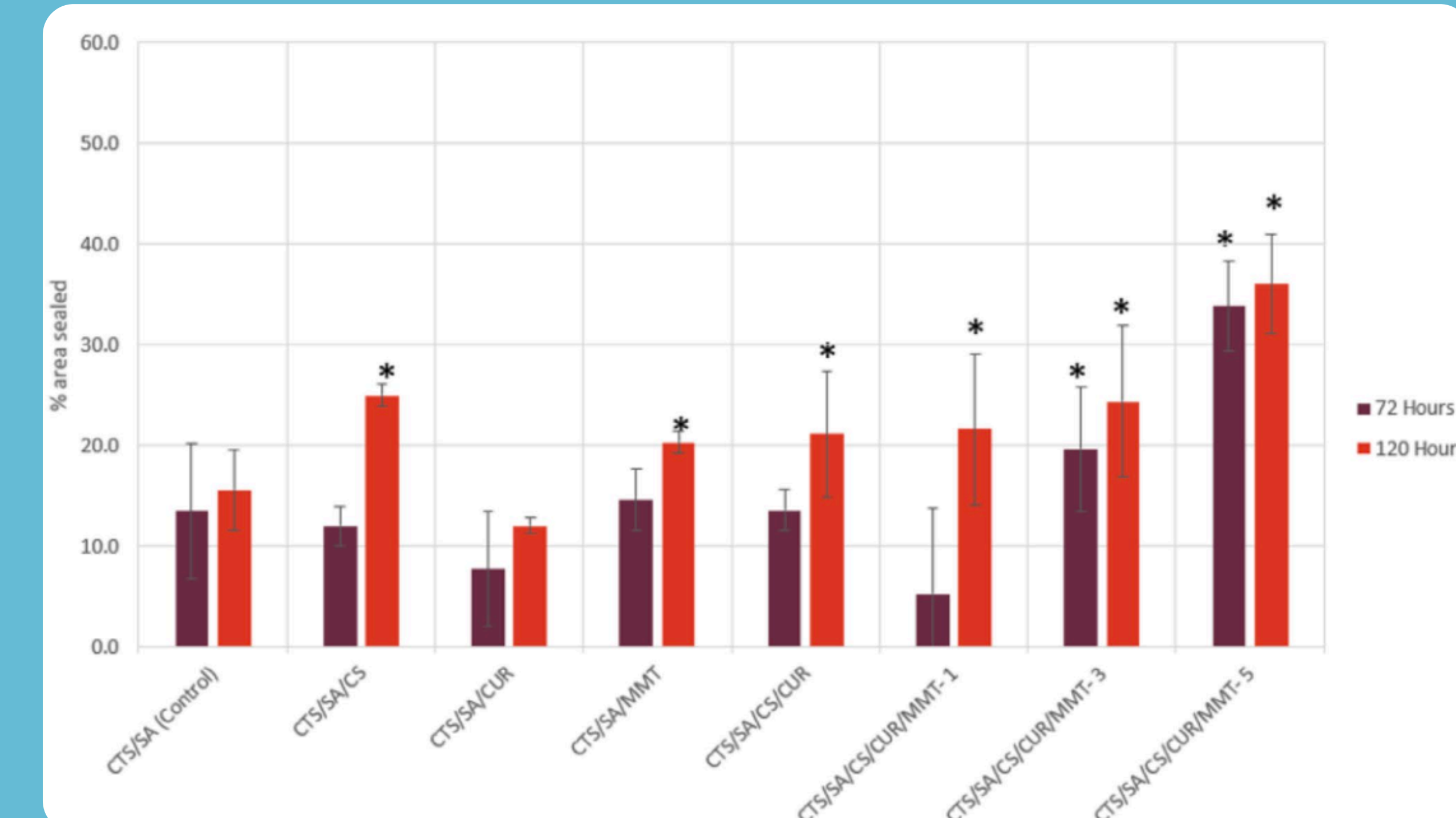
Conclusion

- Alginate-chitosan hydrogels with chrysin, curcumin, and montmorillonite (MMT) were successfully developed.
- Showed enhanced drug entrapment and sustained release of bioactive compounds.
- Demonstrated potent antibacterial activity against *Staphylococcus aureus* and *Pseudomonas aeruginosa*.
- Confirmed biocompatibility with HaCaT cells (non-cytotoxic).
- Exhibited superior wound healing potential compared to controls.
- Montmorillonite proved effective as an additive for advanced drug-delivery dressings.

Antibacterial



Scratch Assay (Wound Healing)



Connection to SDG-3

- This hydrogel contributes to SDG-3 by promoting faster wound recovery, reducing infection, and enhancing patient well-being.
- The hydrogel's demonstrated broad-spectrum antibacterial efficacy (against *S. aureus* and *P. aeruginosa*) enhances its utility for safe, effective, and affordable wound care — a cornerstone of primary healthcare and infection control.

References

- S. Kaushik, Z. W. Ong, Y. K. Liew, W. M. Lim, L. C. Wong, and Y. Y. Then, "Alginate-Chitosan Hydrogel Loaded With Chrysin, Curcumin, and Montmorillonite for Wound Healing Applications," *Journal of Applied Polymer Science*, Aug. 2025, doi: <https://doi.org/10.1002/app.57827>.
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