

Abstract

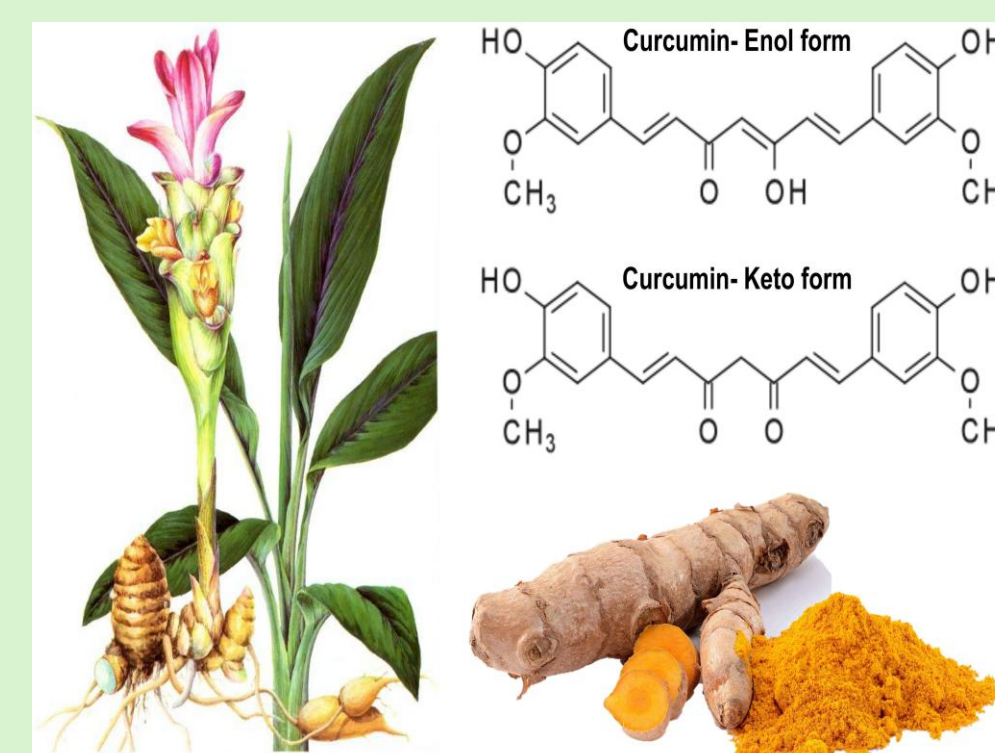
This study discovers the development of novel wound dressings by using curcumin, quercetin, and copper metal-organic frameworks (MOFs) embedded within a chitosan-carboxymethyl cellulose scaffold. The research addresses the limitations of current wound dressings, especially the antibacterial properties and the efficacy of wound healing. Curcumin and quercetin are natural compounds known for their antioxidant, anti-inflammatory, and antimicrobial properties but suffer from poor bioavailability and solubility. To enhance their effectiveness, they are encapsulated in copper MOFs, which allow for controlled release. The scaffold is designed to mimic the extracellular matrix, which can promote cell proliferation and migration while providing sustained drug delivery. This study evaluates the physicochemical properties, antibacterial efficacy, cytocompatibility, and wound-healing capabilities of the scaffold. Preliminary results suggests that the integration of curcumin, quercetin, and copper MOFs significantly improves the scaffold's antibacterial activity and promotes better wound healing compared to traditional dressings.

Introduction

Curcumin (compound of turmeric) and quercetin (plant flavonoid) are natural compounds known for their antioxidant, anti-inflammatory, and antimicrobial properties but suffer from poor bioavailability and solubility.

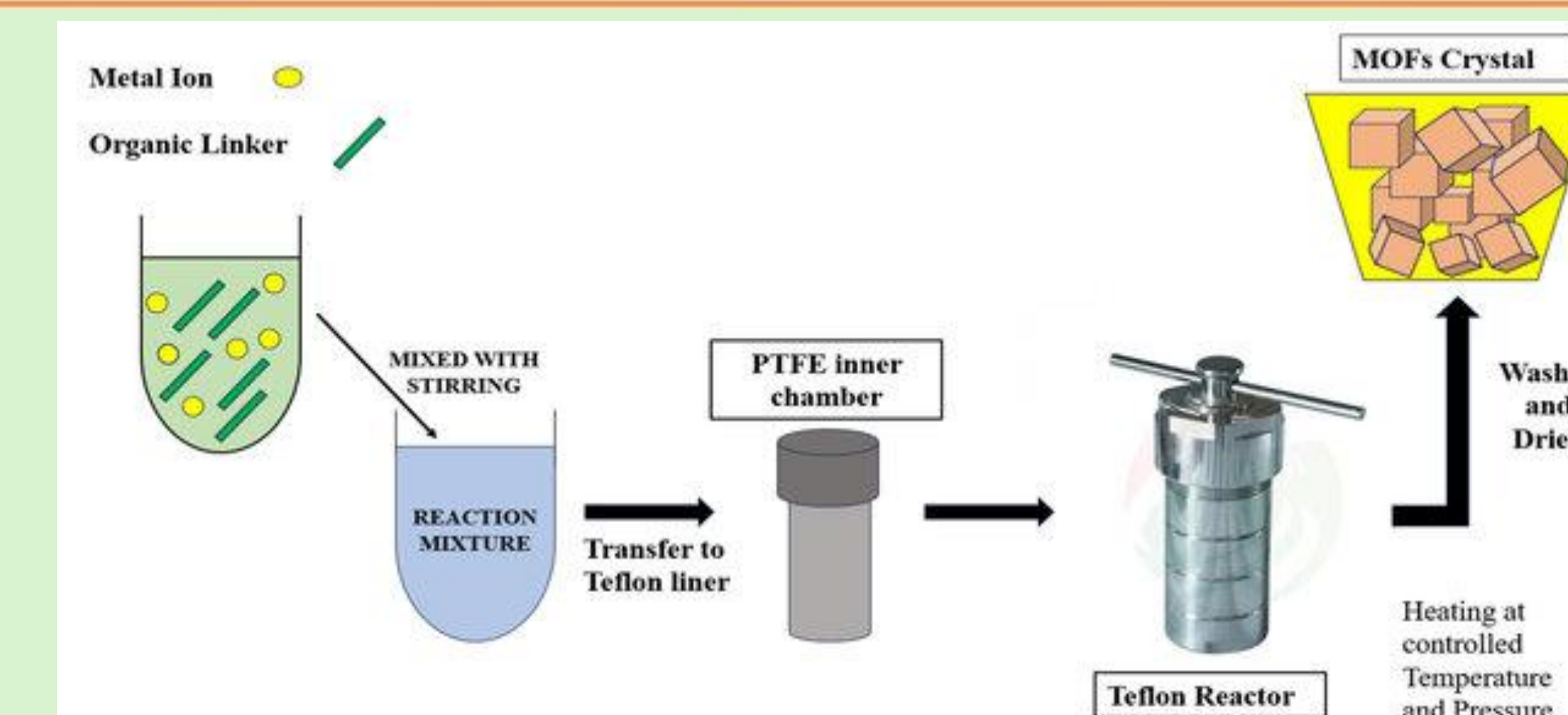
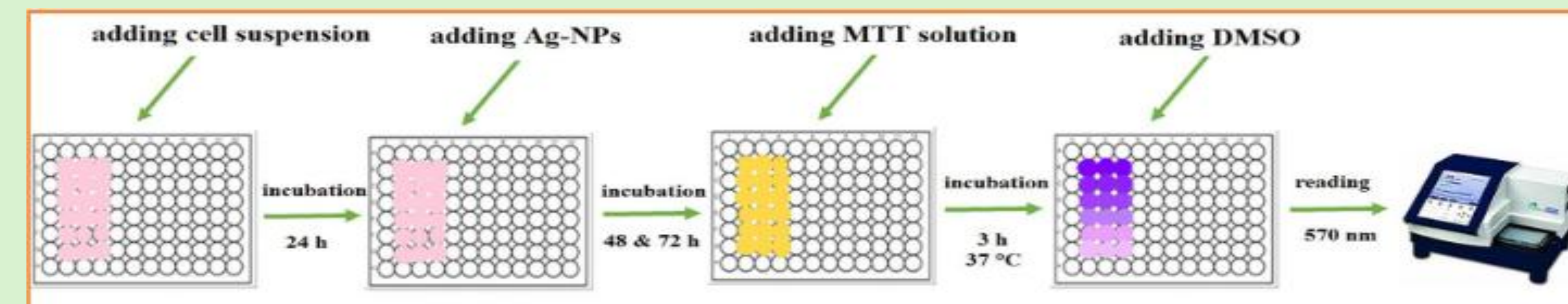
Research Objective

To investigate effectiveness of curcumin and quercetin encapsulated in copper Metal-Organic Frameworks (MOFs), within chitosan-carboxymethyl cellulose (CMC) and Chitosan mixture scaffolds as a drug delivery system to enhance antibacterial properties and promote wound healing.



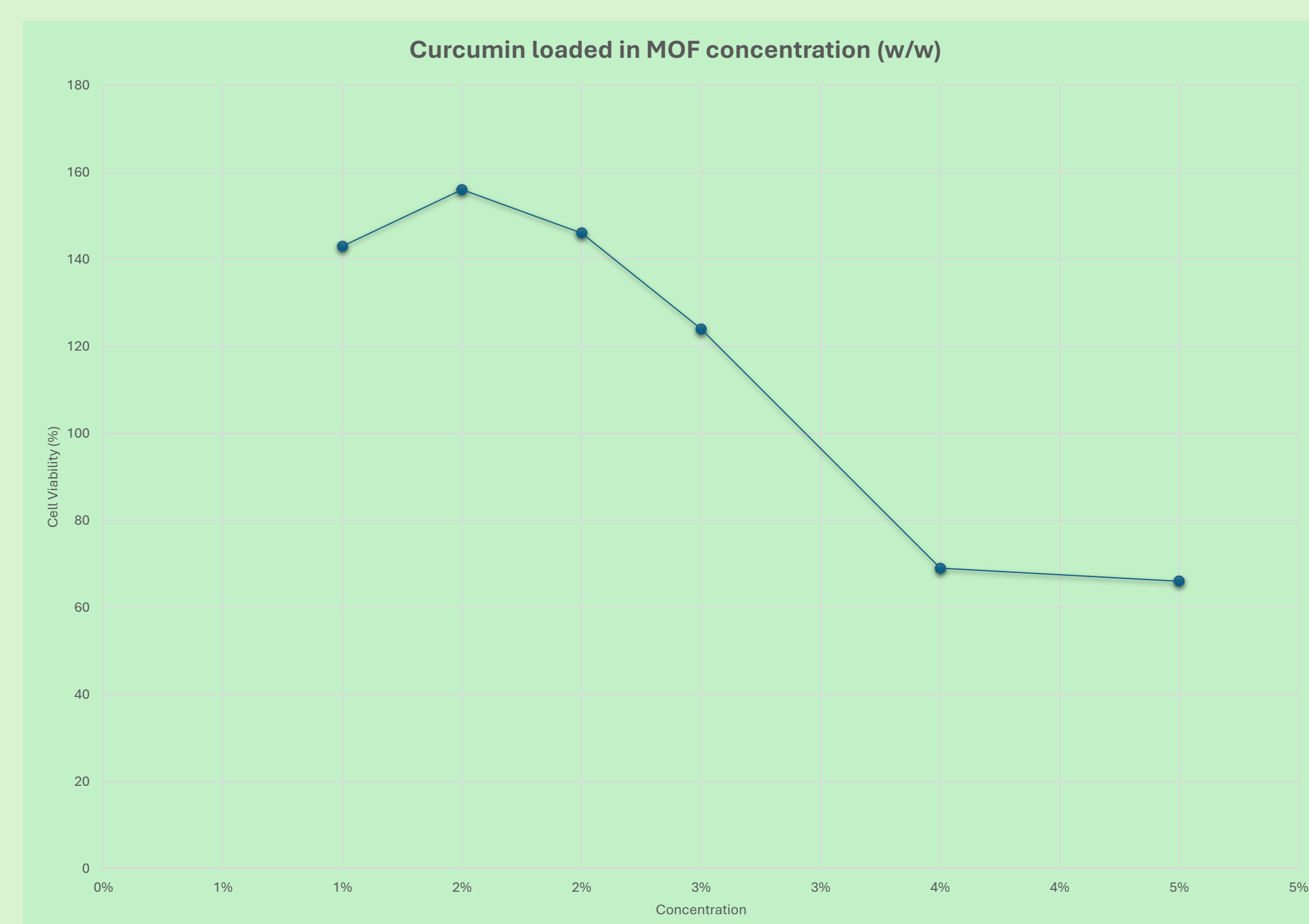
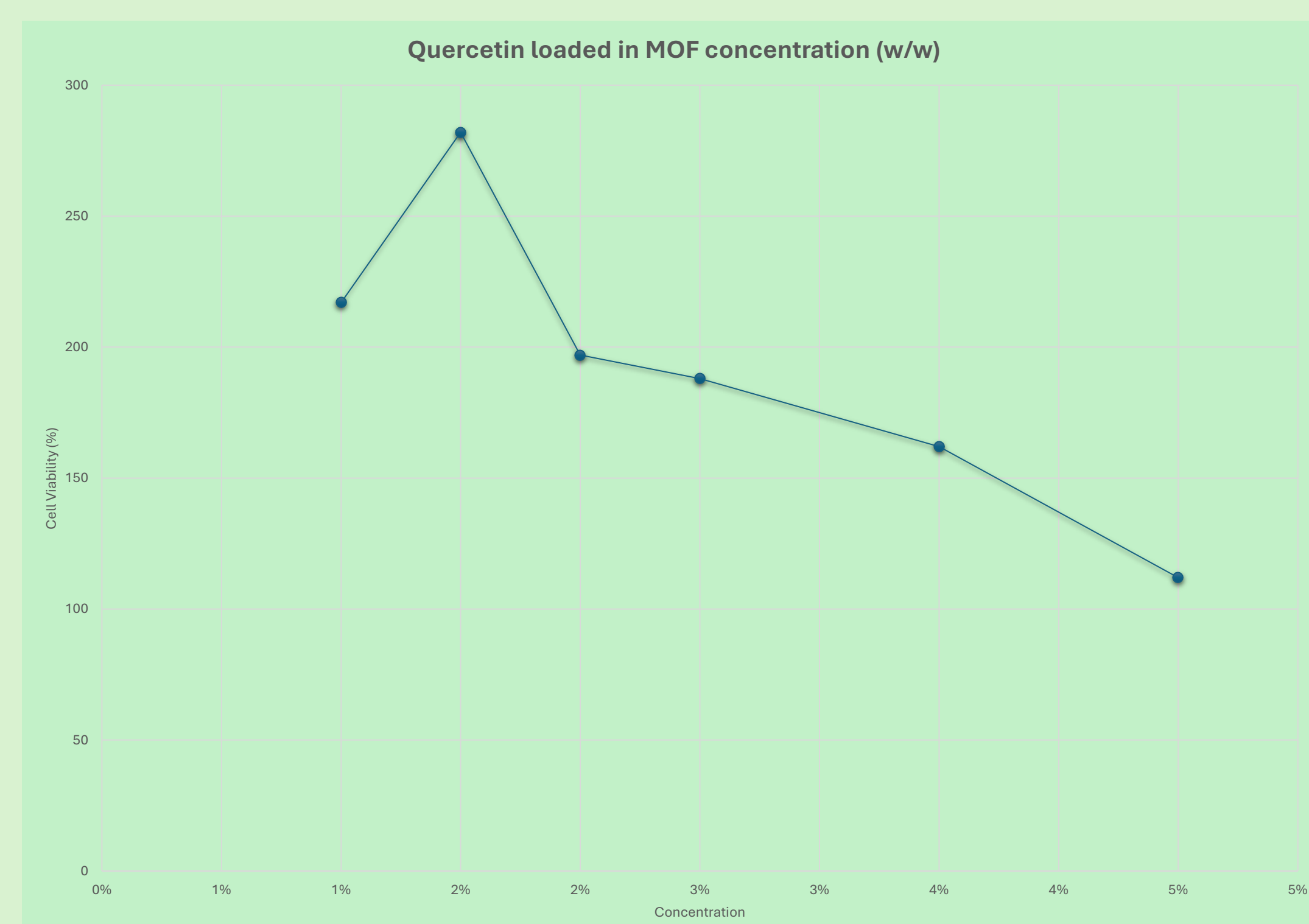
Methodology

Synthesis of copper MOFs & MTT Assay:



Result & Discussion

Cell Viability (MTT Assay) :



Copper MOFs:



Conclusion

Copper MOFs were successfully synthesised via solvothermal method & both quercetin and curcumin at 1.5% exhibits highest cell metabolic activity.

Acknowledgement

This project was funded by International Medical University (IMU) under project ID BPC I-2022 (05)

References

- Comino-Sanz, I.M. *et al.* (2021) 'The role of antioxidants on wound healing: A review of the current evidence', *Journal of Clinical Medicine*, 10(16), p. 3558. doi:10.3390/jcm10163558.
- Kumari, A. *et al.* (2022) 'Wound-healing effects of curcumin and its nanoformulations: A comprehensive review', *Pharmaceutics*, 14(11), p. 2288. doi:10.3390/pharmaceutics14112288.
- Lalawmpuia, R. *et al.* (2023) *Metal Organic Framework (MOF): Synthesis and fabrication for the application of electrochemical sensing* [Preprint]. doi:10.20944/preprints202309.0192.v1.

Project Team

