

Development and Functional Evaluation of Gallium-Carboxymethyl Cellulose Scaffolds Incorporating Chrysin: Physicochemical and Antibacterial Insights



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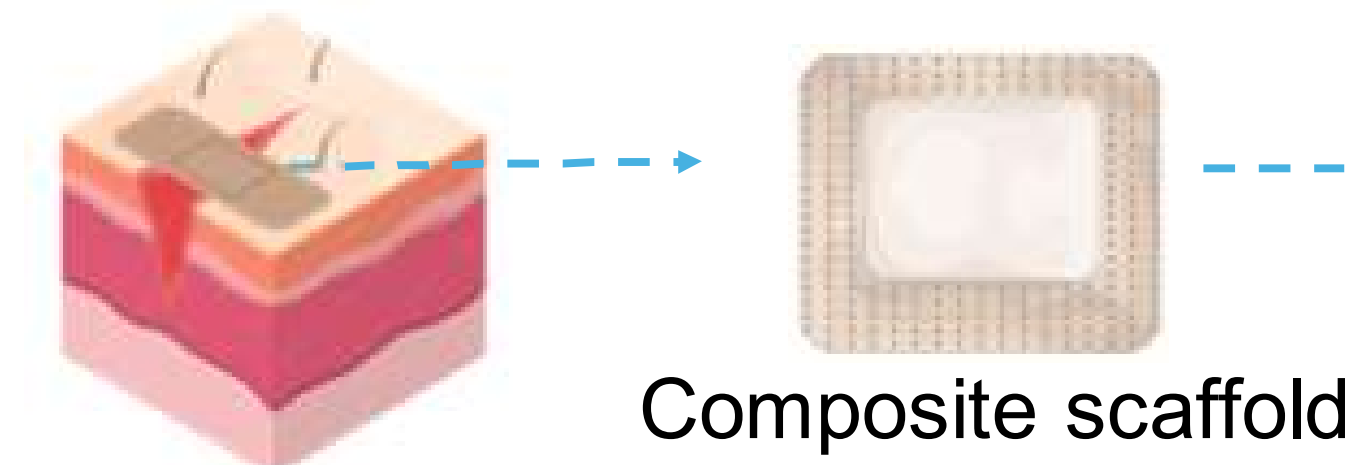
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ABSTRACT

- Wound recovery is often impeded by infection and oxidative stress.
- Traditional dressings lack multifunctional protection.

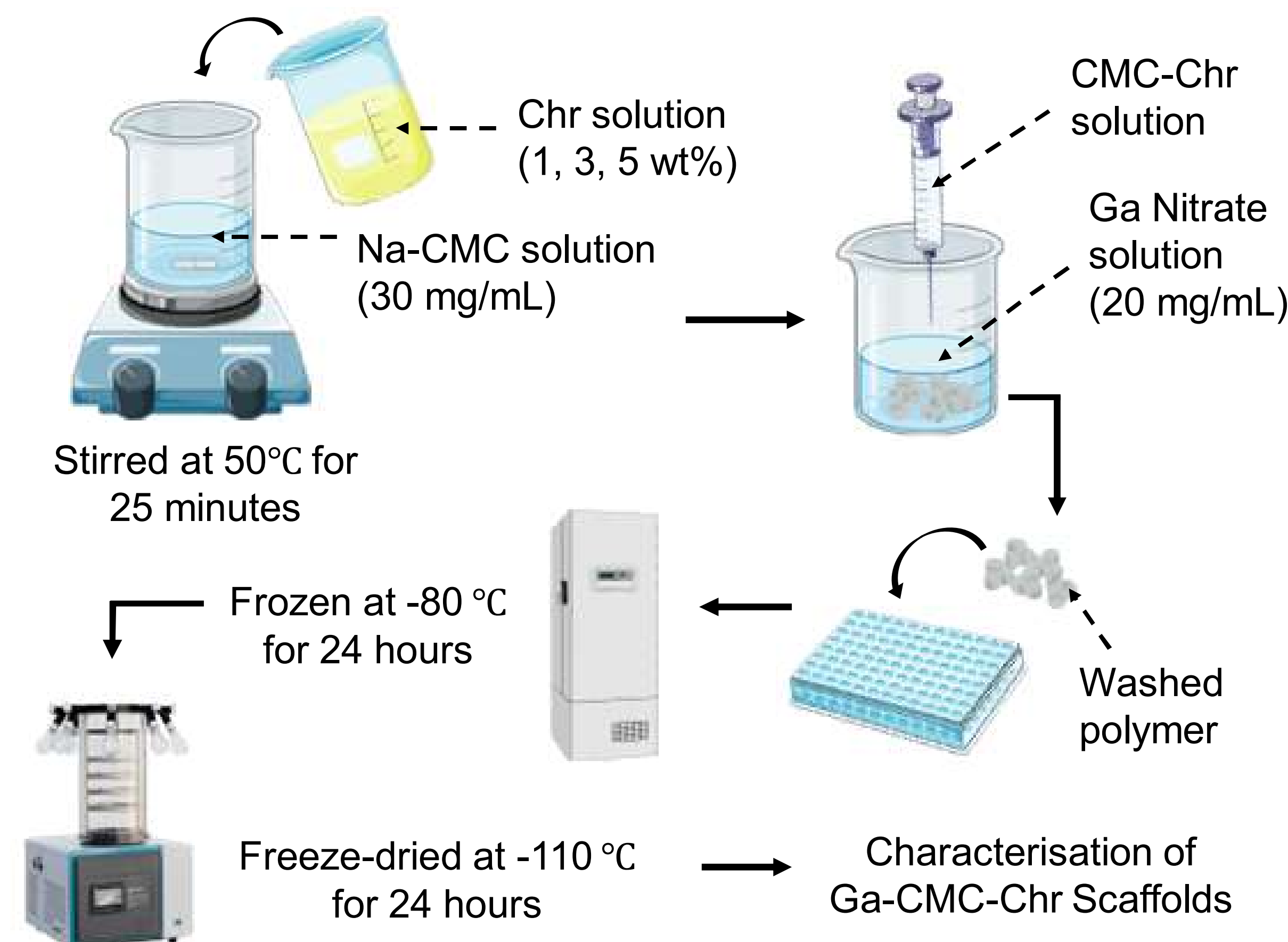
- Developed: **Gallium-Carboxymethyl Cellulose-Chrysin (Ga-CMC-Chr)** scaffolds.



- Biocompatible
- Antioxidant
- Antibacterial

- Enhances global well-being by promoting faster tissue repair while simultaneously lowering the risk of infection and related complications.

METHODOLOGY



RESULTS

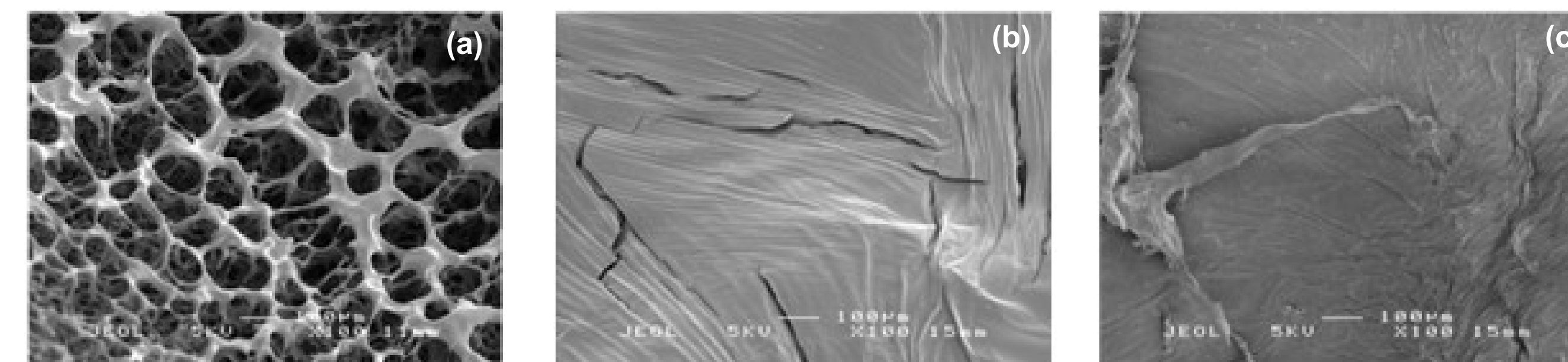


Figure 1. (a) Scanning Electron Microscopy (SEM) micrographs of CMC. (b) SEM micrographs of Ga-CMC scaffold. (c) SEM micrographs of Ga-CMC-Chr-3 scaffold. All SEM micrographs are shown in 100× magnification.

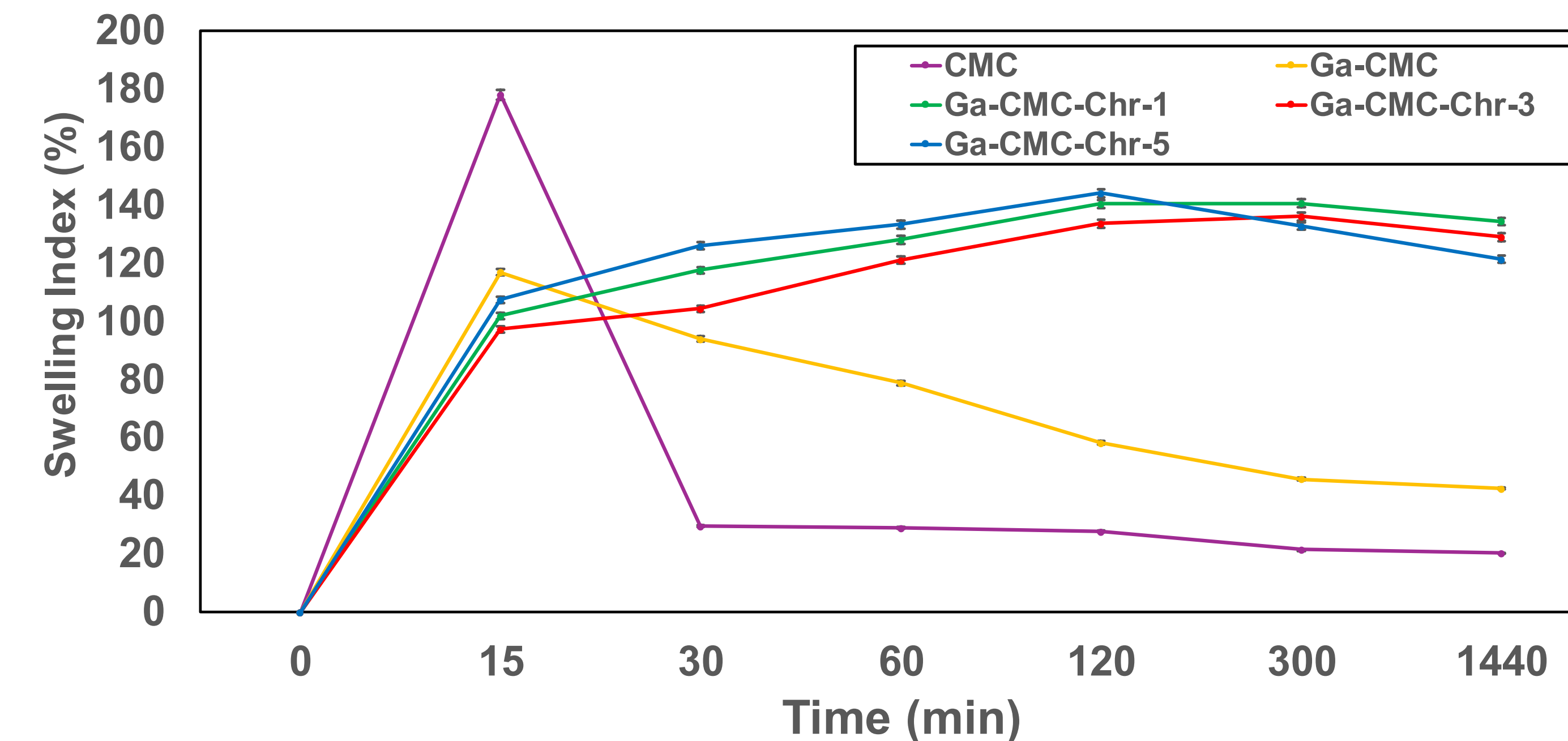


Figure 2. The swelling analysis of the scaffolds at different time intervals. The results are presented in average $\pm$ standard error (n=3).

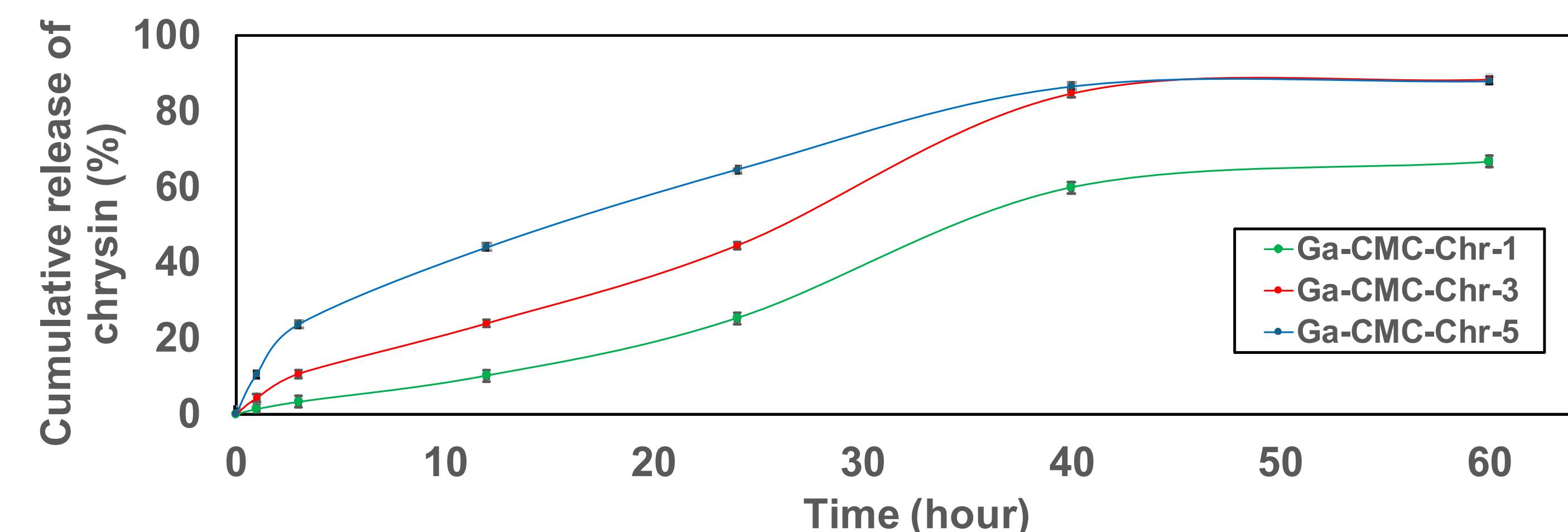


Figure 3. The *in-vitro* cumulative release of chrysin curve for the scaffolds over 60 hours. The results are presented in average $\pm$ standard error (n=3).

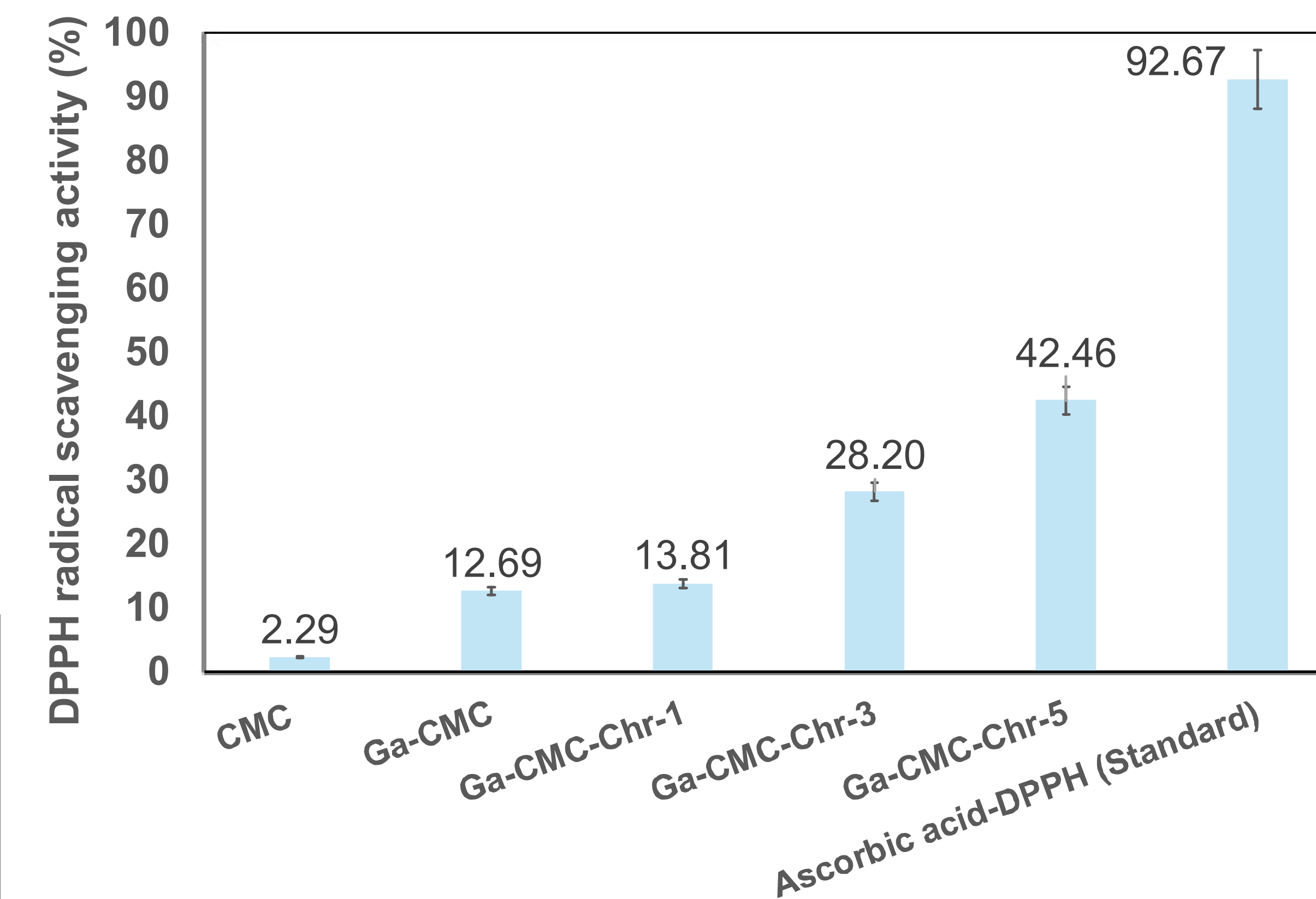


Figure 4. The DPPH radical scavenging activity of scaffolds in comparison to the standard antioxidant, ascorbic acid-DPPH. The results are presented in average $\pm$ standard error (n=3).

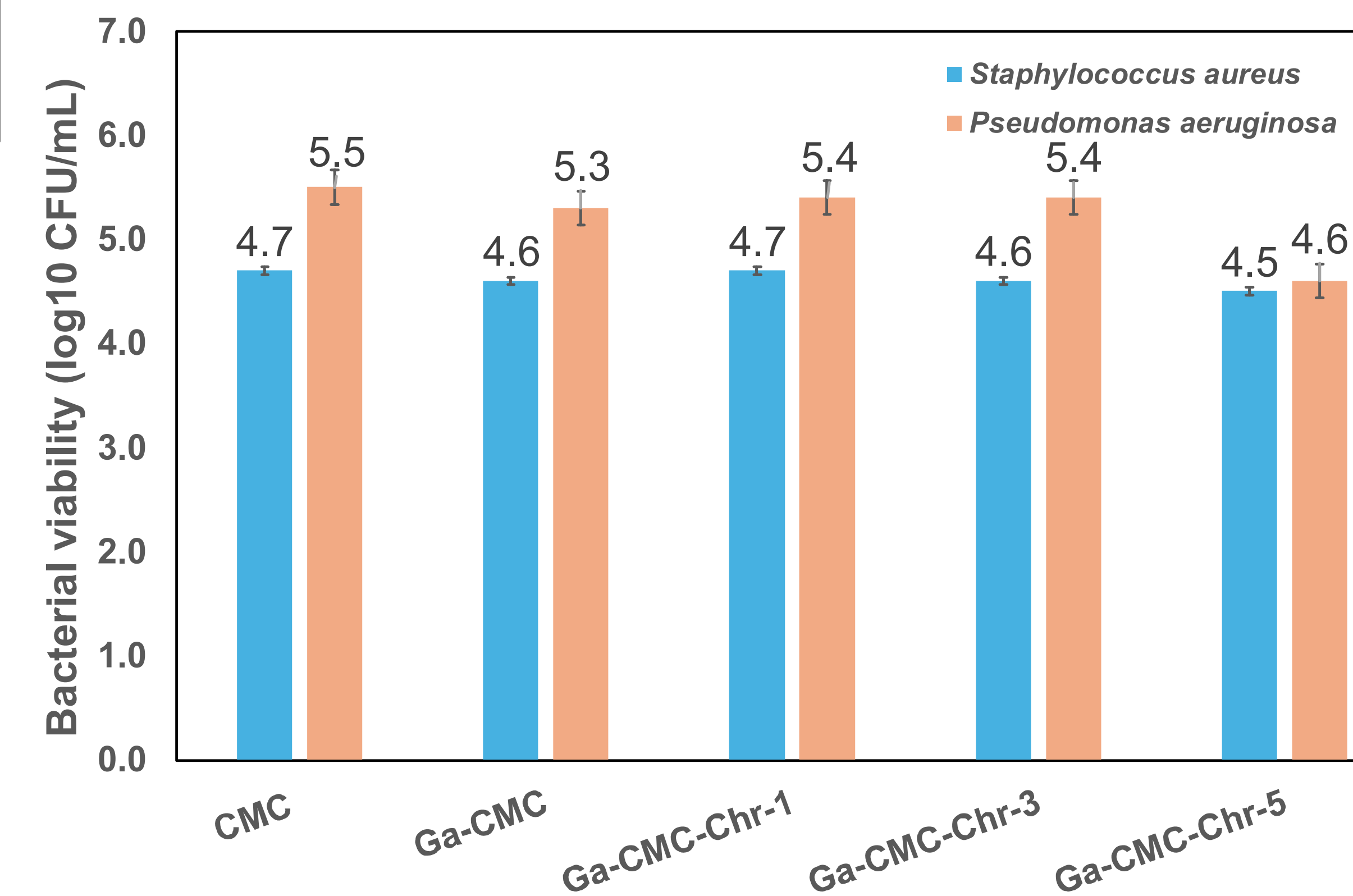


Figure 5. The antibacterial activity of the scaffolds against *Staphylococcus aureus* and *Pseudomonas aeruginosa*, two common bacterial strains associated with wound infections. The results are presented in average $\pm$ standard error (n=3).

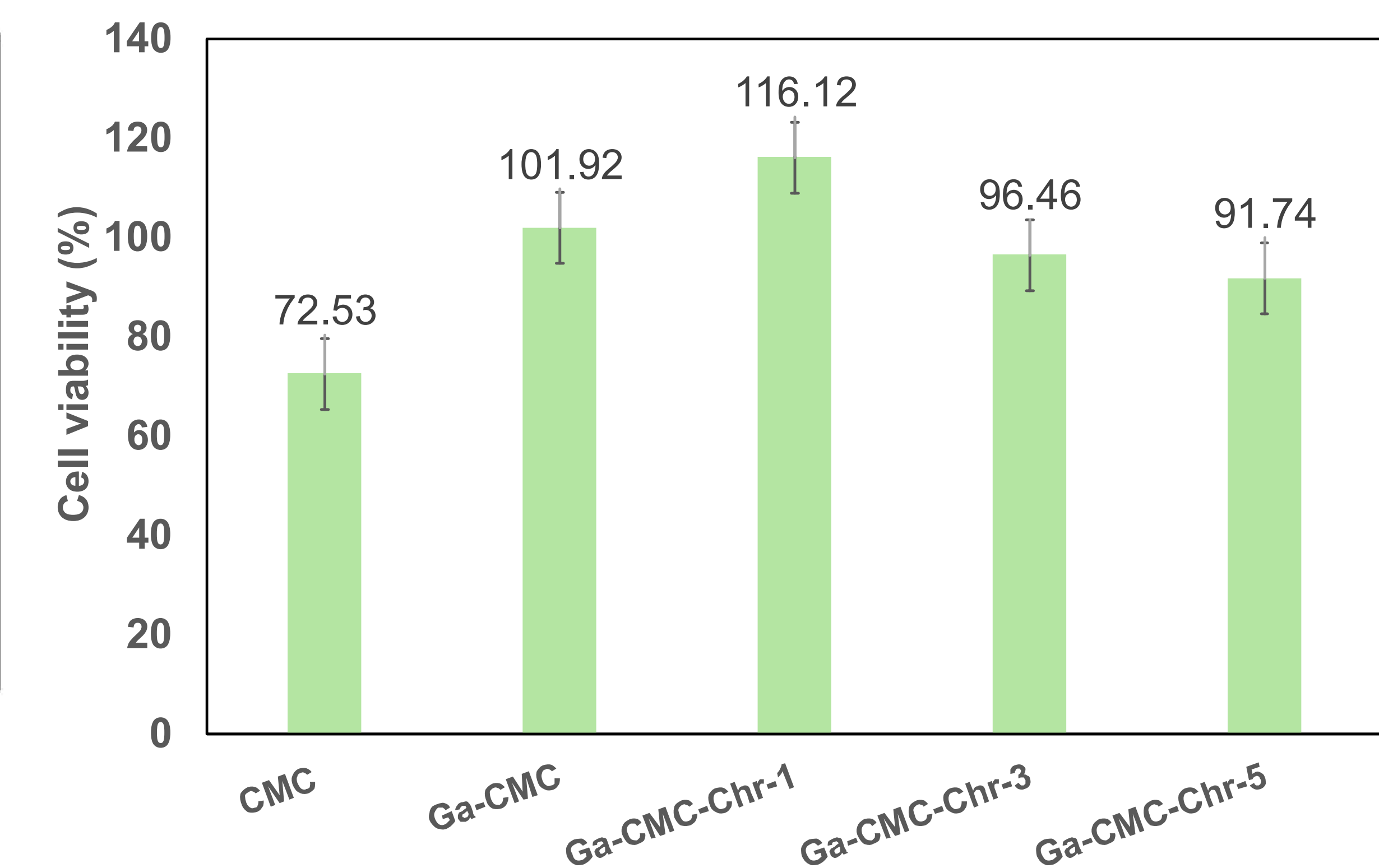


Figure 6. The cell viability of human keratinocyte cell lines (HaCaT cells) after treatment with scaffold extracts (3 mg/mL). The results are presented in average $\pm$ standard error (n=3).

CONCLUSION

- Ga-CMC-Chr scaffolds enhance porosity, swelling capacity, controlled release, antioxidant performance and safe for human tissue.
- Exhibits measurable antibacterial effect to limit infection.
- Promising candidate for advanced and effective wound healing applications.

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