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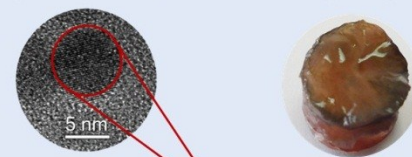
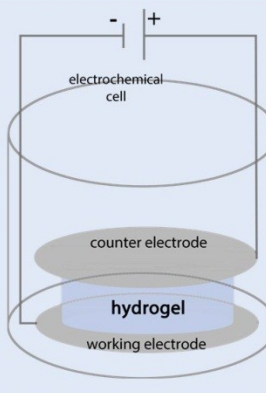
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INTRODUCTION

- Poly(vinyl alcohol)/chitosan (PVA/CHI) hydrogels were cross linked by **freezing-thawing** – simple and green method
- Silver nanoparticles (**AgNPs**) were stabilized by **electrochemical incorporation** inside polymer hydrogel matrices
- Chitosan (CHI)** possesses **intrinsic antibacterial activity**, which provides a **synergistic antibacterial effect** along with AgNPs
- Graphene (Gr)** was added as a nano-filler to improve mechanical properties

EXPERIMENTAL

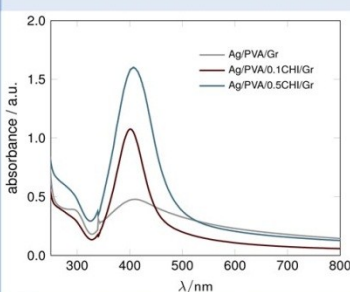
Constant-voltage electrochemical synthesis of AgNPs in the **pre-swollen hydrogel**



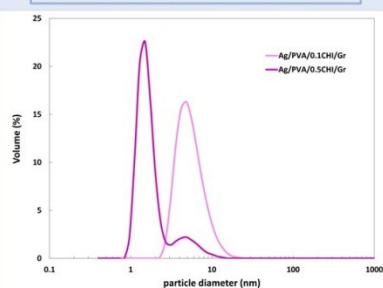
Ag/poly(vinyl-alcohol)/chitosan (**Ag/PVA/CHI/Gr**) hydrogel

RESULTS

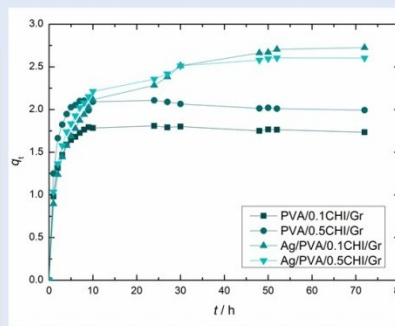
UV-vis: higher AgNPs concentration in hydrogels with higher CHI content



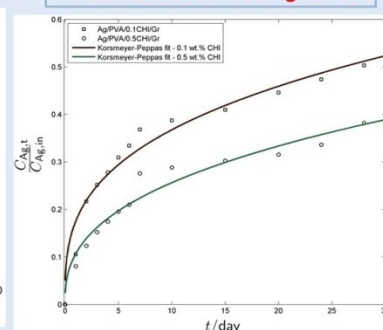
DLS: Z-average AgNPs diameters: 8.06 ± 0.098 nm (Ag/PVA/0.1CHI/Gr) and 6.38 ± 0.12 nm (Ag/PVA/0.5CHI/Gr)



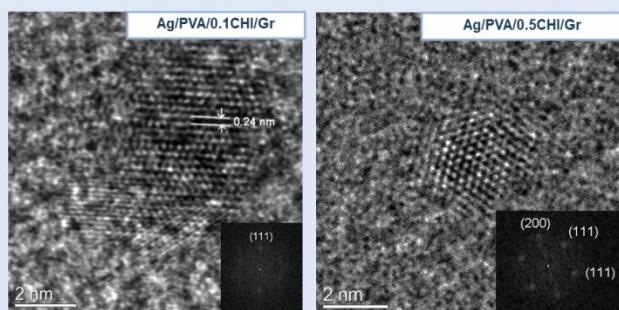
Swelling ability of the hydrogels was improved by incorporation of AgNPs



Burst silver release in the initial period is favorable for efficient inhibition of bacterial growth

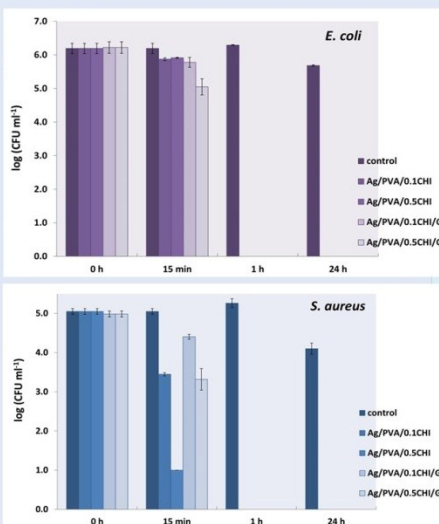


TEM: single crystal and polycrystalline AgNPs ~5-10 nm

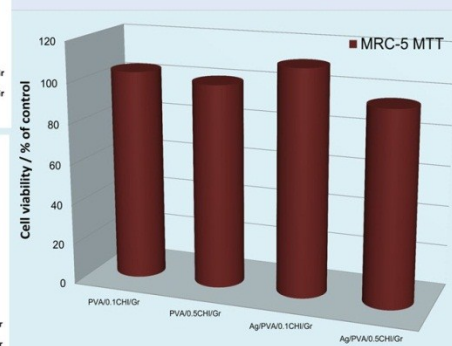


Smaller AgNPs could contribute to **improved antibacterial effect**

Very strong antibacterial activity against *E. coli* and *S. aureus*



MTT assay: Hydrogels were not cytotoxic towards MRC-5 cell line (human fibroblasts) → cell viability > 90 %



CONSLUTIONS

Nanocomposite **Ag/PVA/CHI/Gr** hydrogels were successfully obtained via the **in situ electrochemical AgNPs synthesis method**

UV-vis, DLS and TEM analyses confirmed AgNPs incorporation

TEM and DLS determined that AgNP particle sizes were smaller than 10 nm

Antibacterial and MTT testing confirmed strong potential for wound dressing applications

REFERENCES

- [1] K. Nešović, A. Janković, A. Perić-Grujić, M. Vukašinović-Sekulić, T. Radetić, Lj. Živković, S.-I. Park, K.Y. Rhee, V. Mišković-Stanković, *Journal of Industrial and Engineering Chemistry* **77** (2019) 83–96.
- [2] K. Nešović, A. Janković, T. Radetić, M. Vukašinović-Sekulić, V. Kojić, Lj. Živković, A. Perić-Grujić, K. Y. Rhee, V. Mišković-Stanković, *European Polymer Journal* **121** (2019) 109257.
- [3] K. Nešović, A. Janković, V. Kojić, M. Vukašinović-Sekulić, A. Perić-Grujić, K.Y. Rhee, V. Mišković-Stanković, *Composites Part B: Engineering* **154** (2018) 175–185.