

RESEARCH ARTICLE

3D-printed biomimetic liposomal hydrogels for localized and targeted treatment of drug-resistant *Candida albicans* vaginitis

Supplementary File

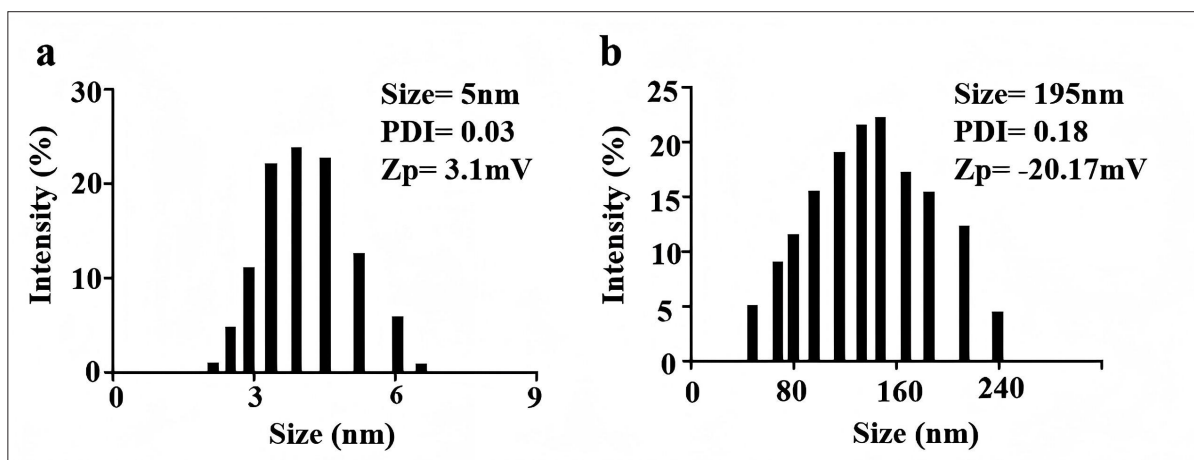


Figure S1. Size distribution and zeta potential (Zp) of silver nanoclusters (AgNCs; a) and Lip@MOMP<sub>2</sub> (b). Abbreviation: PDI, polydispersity index

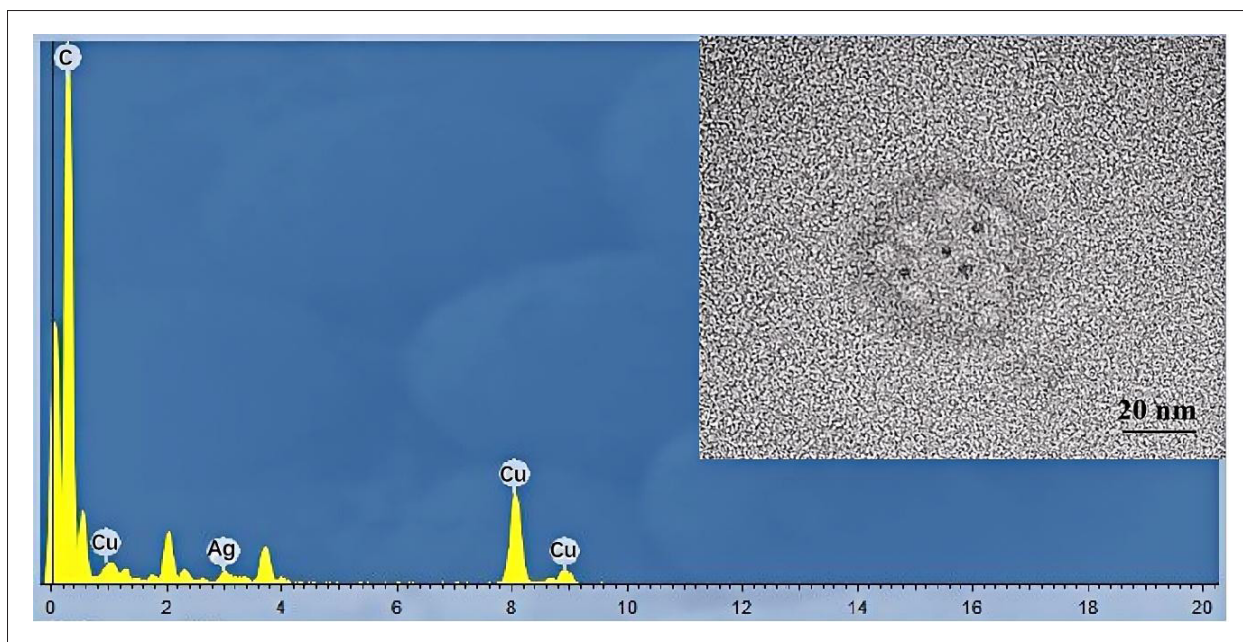


Figure S2. Elemental distribution of C, Ag, and Cu in the Lip@MOMP<sub>2</sub>@AgNCs. Transmission electron microscopy (TEM) image of AgNCs, (inset). Scale bar: 20 nm.

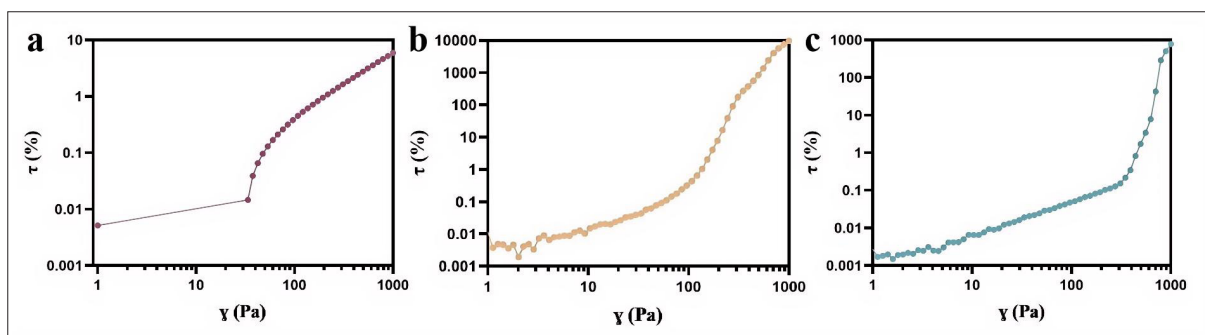


Figure S3. Yield stress curves (stress  $[\tau]$  vs. strain  $[\gamma]$ ) of hydrogels with varying compositions of Lip@MOMP<sub>2</sub>@AgNCs hydrogel; 1:2 (a), 3:2 (b), and 5:2 (c). Yield stress values were determined using tangential analysis.

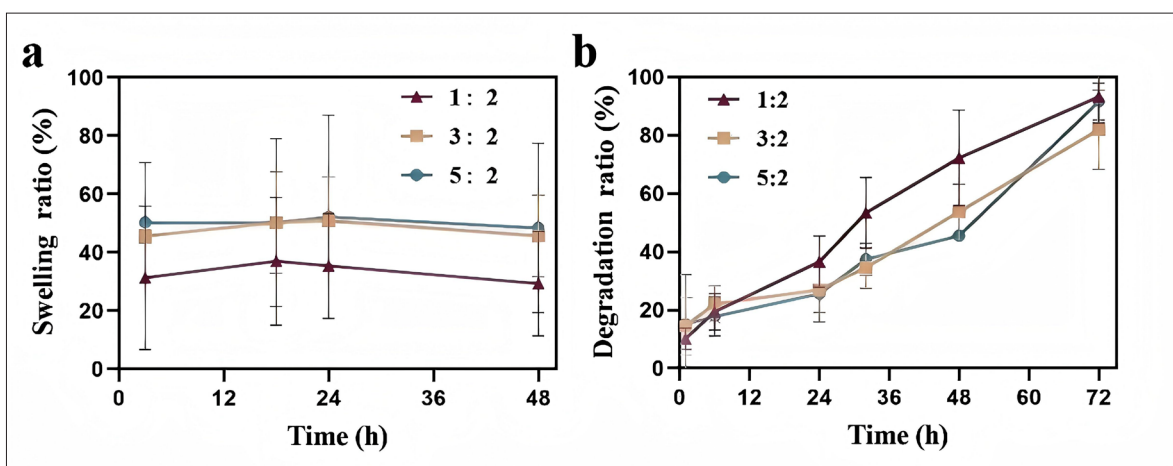


Figure S4. Swelling and degradation curve of the hydrogel. (a) Swelling behavior of different ratios of Lip@MOMP<sub>2</sub>@AgNCs hydrogel in phosphate-buffered saline (PBS) ( $n = 4$ ). (b) Degradation of different ratios of Lip@MOMP<sub>2</sub>@AgNCs hydrogel in hyaluronidase solution over various time periods ( $n = 4$ ).

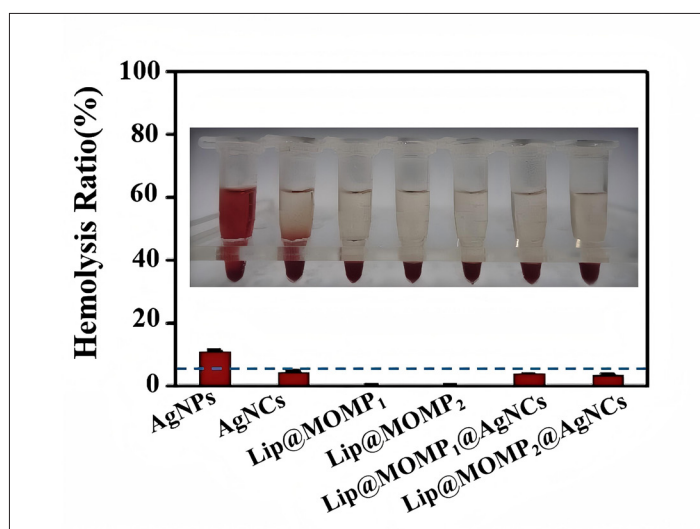
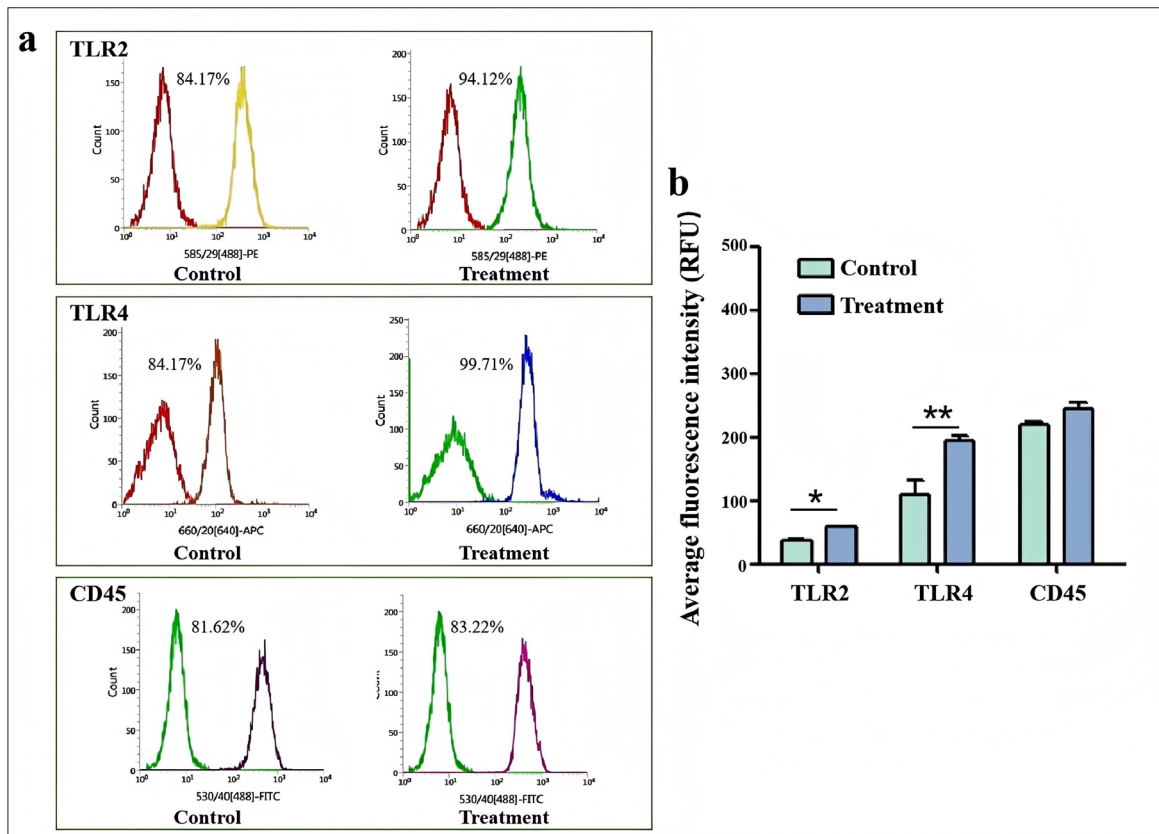
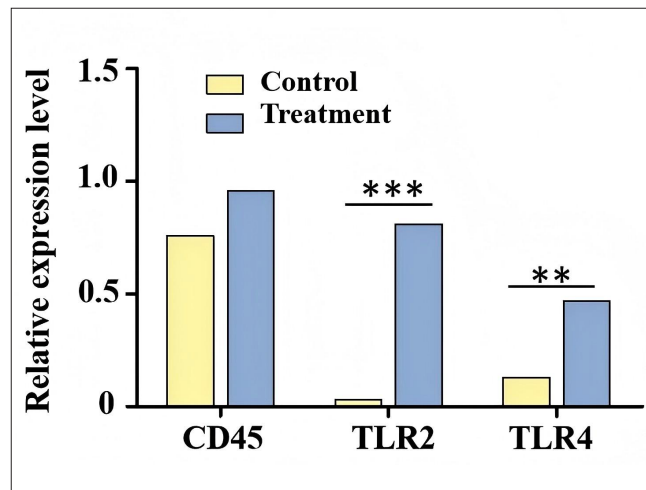


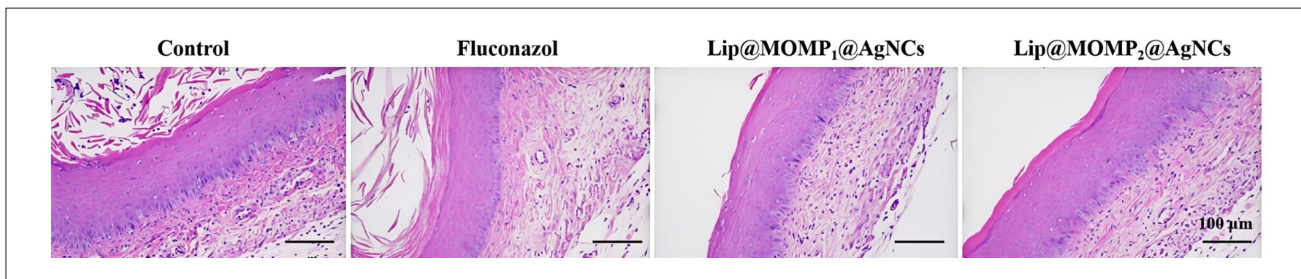
Figure S5. Hemolysis rates of nano silver (AgNPs), silver nanoclusters (AgNCs), Lip@AgNCs, Lip@MOMP<sub>1</sub>@AgNCs, and Lip@MOMP<sub>2</sub>@AgNCs (500  $\mu\text{g}/\text{mL}$ ). The blue line indicates a 5% hemolysis rate. Experimental images of hemolysis rates of different materials (inset).



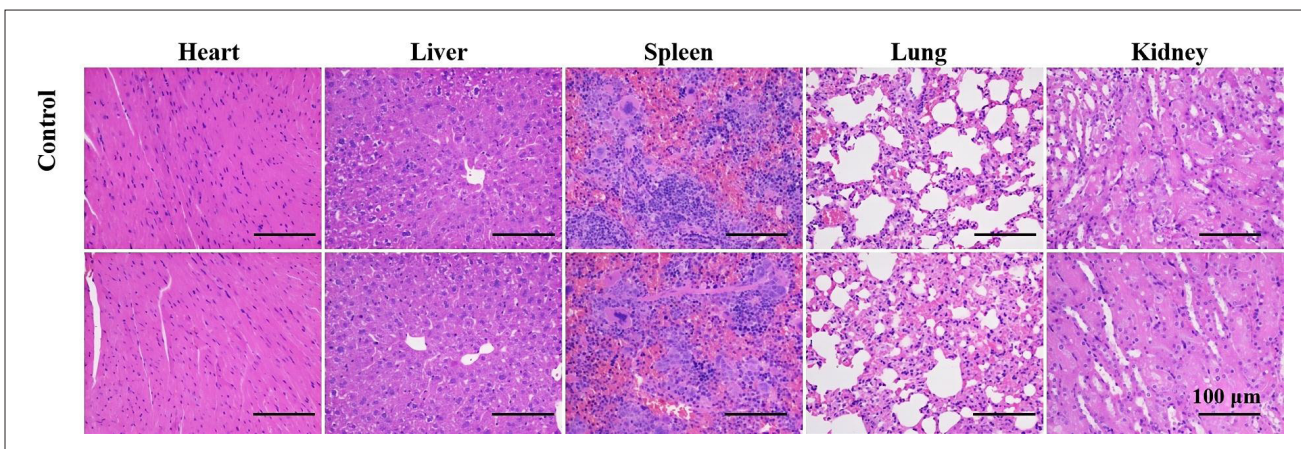
**Figure S6.** Flow cytometry analysis result of TLR2, TLR4, and CD45 expression. (a) Flow cytometry analysis of TLR2, TLR4, and CD45 expression on J774.A1 cells. (b) TLR2, TLR4, and CD45 expression in the treatment group versus the control group ( $n = 3$ ).  $*p < 0.05$ ;  $**p < 0.01$



**Figure S7.** Expression differences of CD45, TLR2, and TLR4 in the control group (J774.A1 cell membrane protein MOMP<sub>1</sub>) and the treatment group (membrane protein MOMP<sub>2</sub> extracted from J774.A1 cells treated with *Candida albicans*).  $**p < 0.01$ , and  $***p < 0.001$ .



**Figure S8.** Hematoxylin and Eosin (H&E) staining of vaginal tissue from the control group (saline), fluconazole group, Lip@MOMP<sub>1</sub>@AgNCs hydrogel group, and Lip@MOMP<sub>2</sub>@AgNCs hydrogel group on day 21 (post-treatment). Scale bars: 100 μm.



**Figure S9.** Histopathological analysis of various organs (heart, liver, spleen, lungs, and kidneys) in mice treated with Lip@MOMP<sub>2</sub>@AgNCs compared to normal mice.