

Supplementary

Prebiotics and Postbiotics Synergistic Delivery Microcapsules from Microfluidics for Treating Colitis

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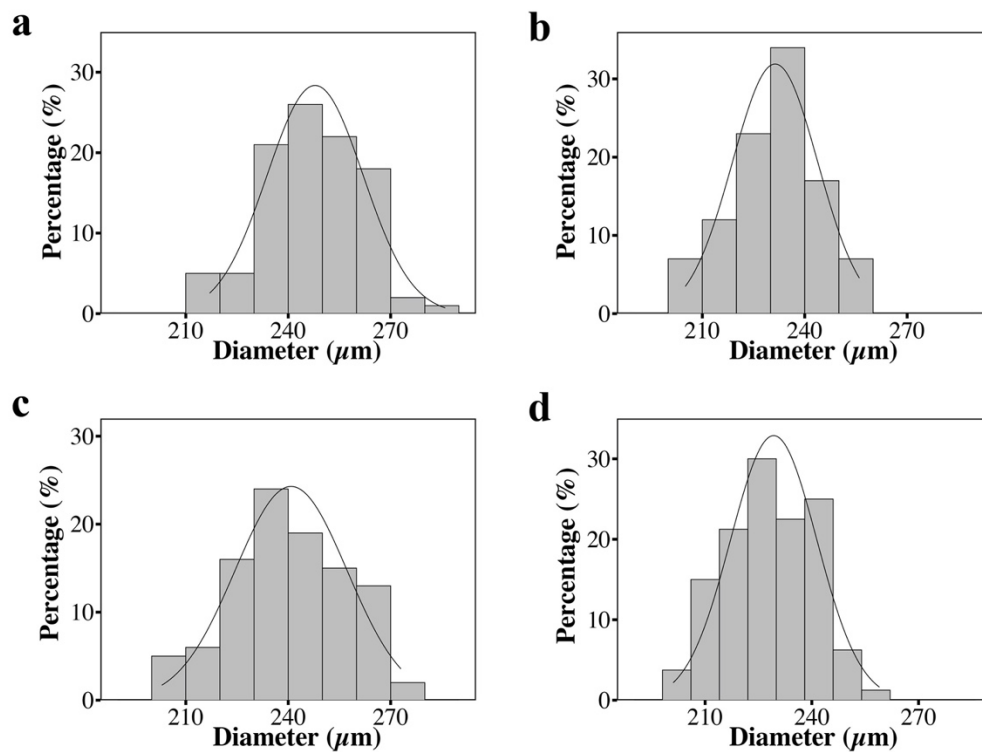


Figure S1. Diameter distribution of the (a) Alg/RS, (b) Alg/RS/CS, (c) IPA@Alg/RS and (d) IPA@Alg/RS/CS microcapsules. Alg: alginate. RS: resistant starch. CS: chitosan. IPA: indole-3-propionic acid.

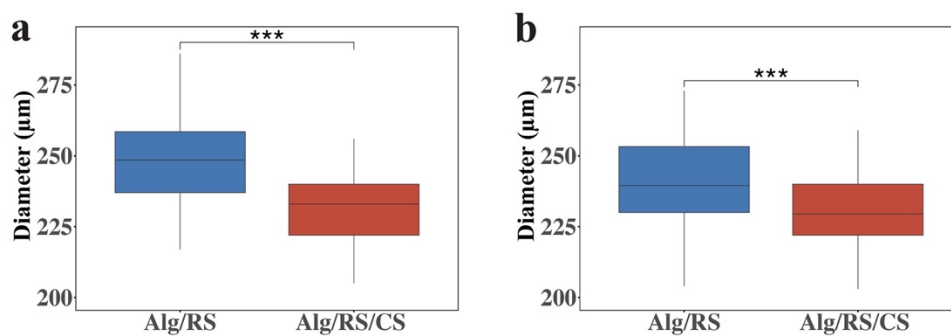


Figure S2. Decreased diameter of (a) microcapsules (MC) and (b) IPA microcapsules (IPA@MC) after coating chitosan. Student's t-test was applied to test for significance between groups. *** $p < 0.001$.

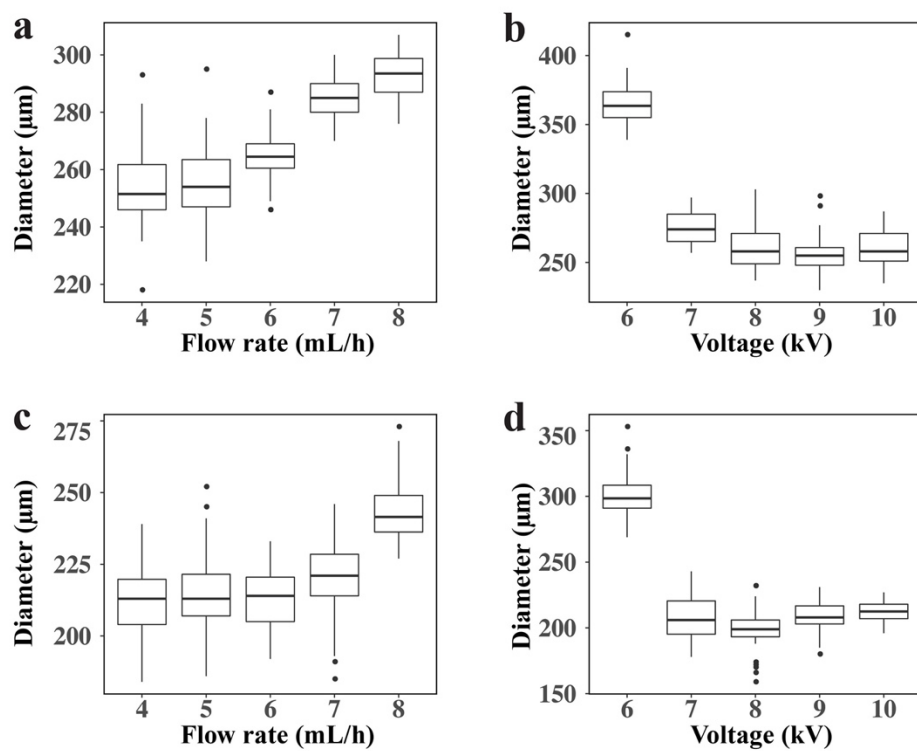


Figure S3. The influences of the (a, c) flow rate and (b, d) voltage on the sphere diameter of IPA@MC before (a, b) and after chitosan coating (c, d).

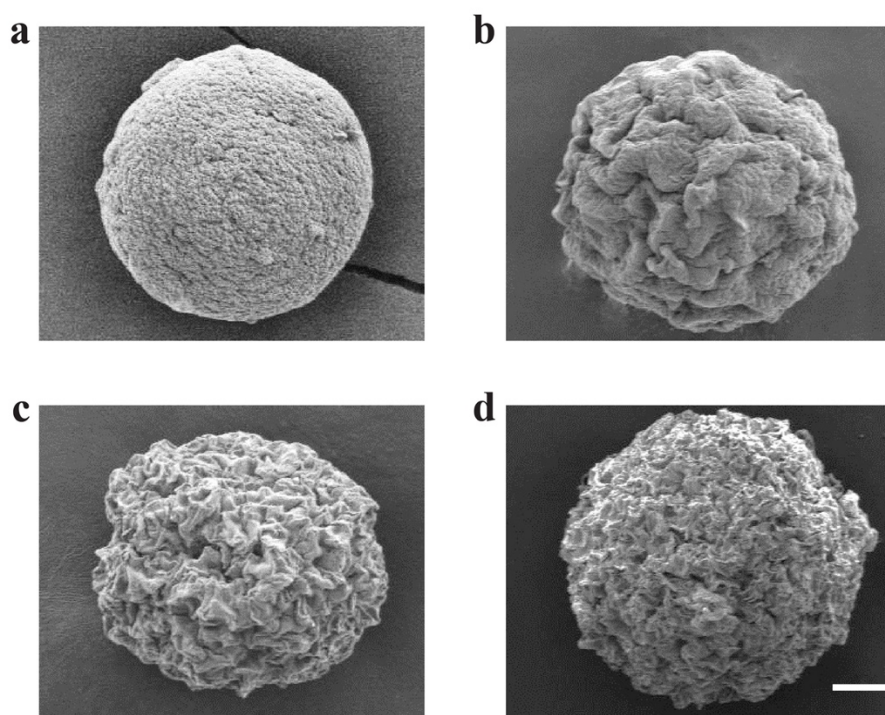


Figure S4. SEM images showing increased wrinkling level of the IPA@MC surface with increasing IPA concentrations of (a) 0%, (b) 1%, (c) 2% and (d) 3%. The scale bar is 20 μm .

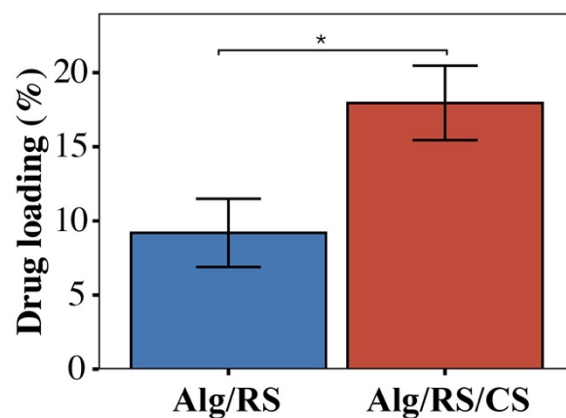


Figure S5. Increased DLR for IPA@MC after chitosan coating compared with IPA@MC without chitosan coating. IPA@MC with initial IPA concentrations of 2.0% was measured between groups. Student's t-test was applied to test for significance between groups. * $p < 0.05$.

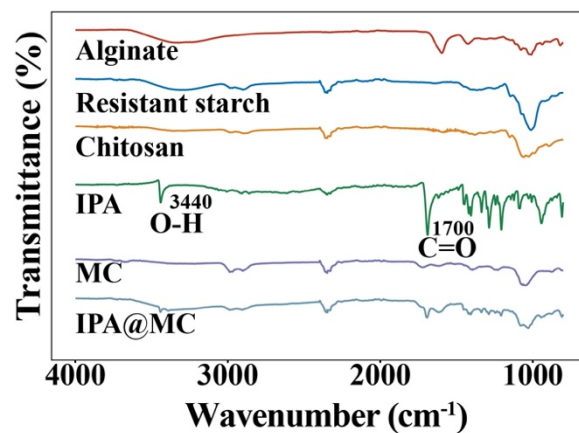


Figure S6. FTIR spectra of IPA@MC and its gradients.

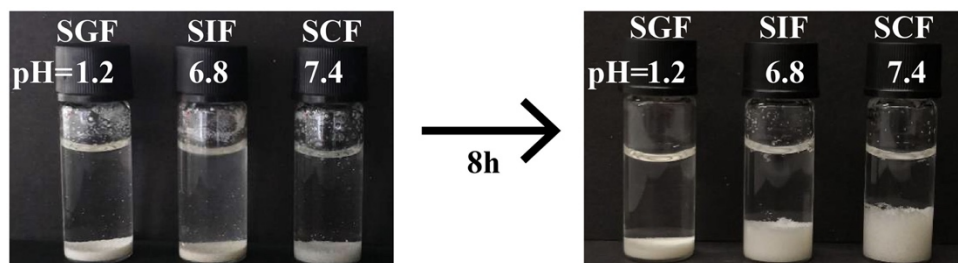


Figure S7. Digital photos of the swelling IPA@MC after 8 hours in SGF (pH = 1.2), SIF (pH = 6.8) and SCF (pH = 7.4). SGF: simulated gastric fluid; SIF: simulated intestinal fluid; SCF: simulated colonic fluid.

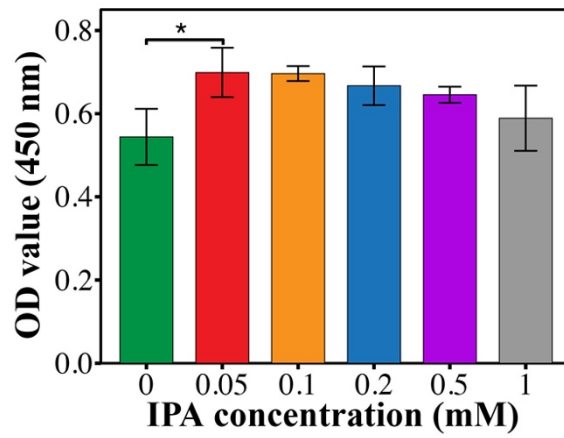


Figure S8. Proliferation of 3T3 cells treated with different concentrations of IPA from 0 to 1 mM for 2 days. The cell proliferation was measured by CCK-8 assay. The OD value was measured at 450 nm. Student's t-test was applied to test for significance between groups. * $p < 0.05$.

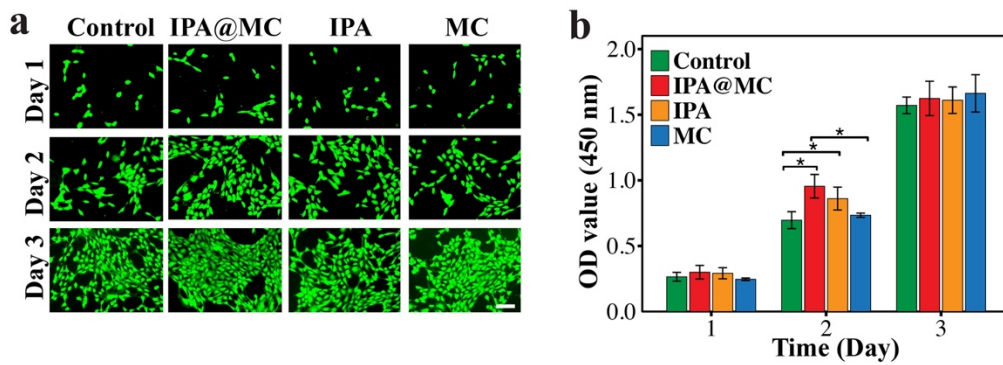


Figure S9. Cytocompatibility of IPA microcapsules. (a) The fluorescent images of 3T3 cells co-culture with IPA@MC, 0.05 mM IPA and MC. (b) Proliferation of 3T3 cells measured by CCK-8 assay from day 1 to day 3. The OD value was measured at 450 nm. The scale bar is 100 μ m in (a). Student's t-test was applied to test for significance between groups. * $p < 0.05$.

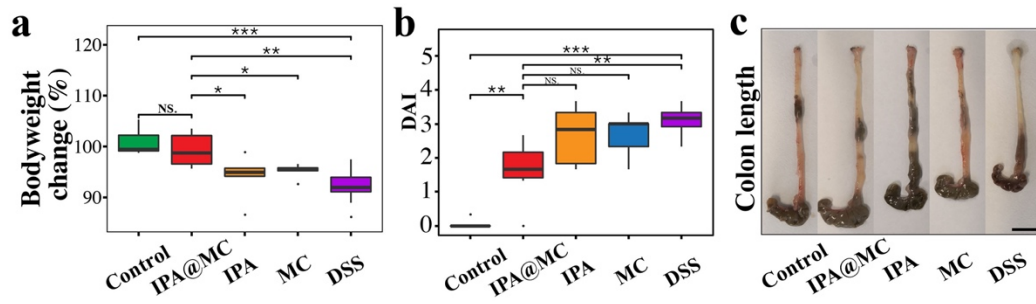


Figure S10. Protective efficacy of IPA@MC against DSS-colitis in mice on day 7 (n=6, per group). Body weight change (a), disease activity index (b) and colon length (c) for the mice after various treatments. Student's t-test was applied to test for significance between groups. ** $p < 0.01$, *** $p < 0.001$. DAI: disease activity index. The scale bar is 1 cm in (c). Mice were randomized into 5 groups (Control: PBS + normal water; IPA@MC: IPA microcapsules + DSS water; IPA: IPA + DSS water; MC: empty microcapsules + DSS water; DSS: PBS + DSS water).

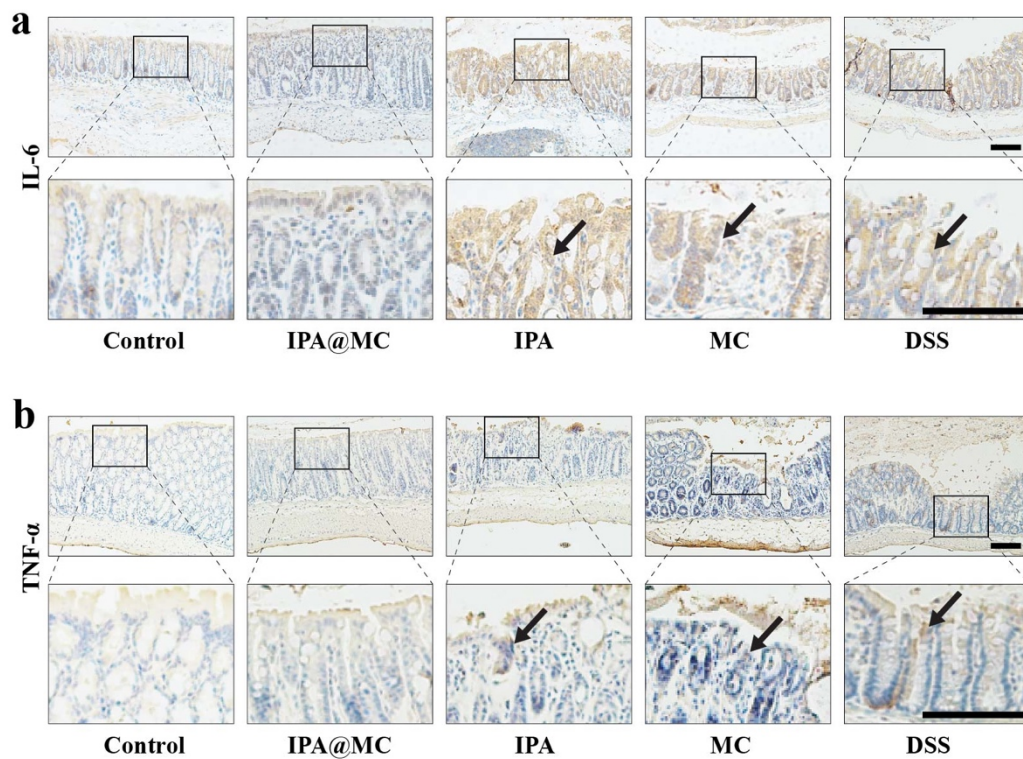


Figure S11. Representative IHC staining images for IL-6 (a) and TNF- α (b) on day 7. The scale bar is 100 μ m. The arrows indicate the expression of markers. Mice were randomized into 5 groups (Control: PBS + normal water; IPA@MC: IPA microcapsules + DSS water; IPA: IPA + DSS water; MC: empty microcapsules + DSS water; DSS: PBS + DSS water).

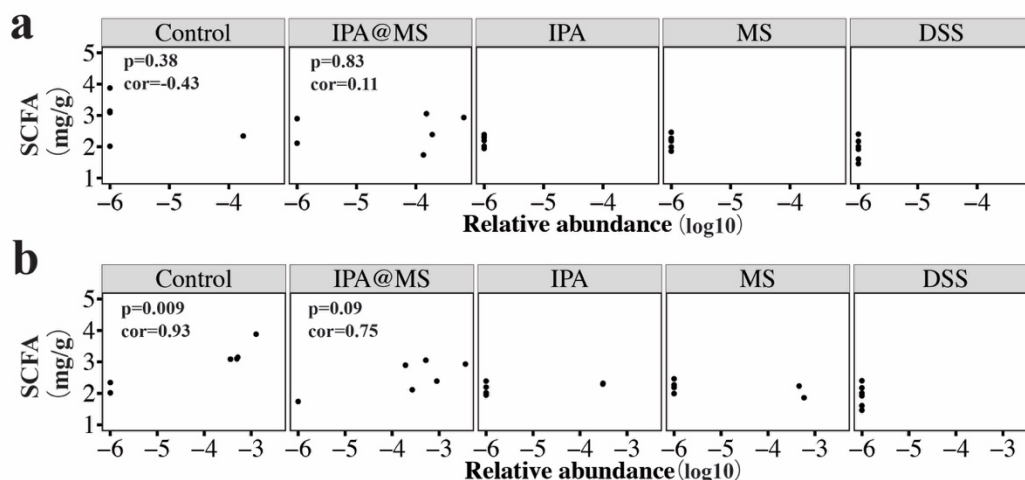


Figure S12. Correlations between total level of SCFA and bacterial genera (a) *Faecalibacterium* and (b) *Roseburia*, respectively. Correlation was calculated by Pearson correlation. Mice were randomized into 5 groups (Control: PBS + normal water; IPA@MC: IPA microcapsules + DSS water; IPA: IPA + DSS water; MC: empty microcapsules + DSS water; DSS: PBS + DSS water).

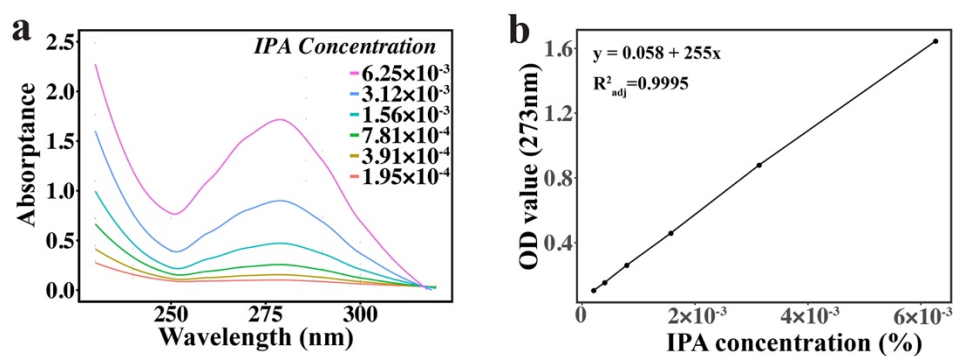


Figure S13. (a) UV absorbance spectra of the aqueous solution with different IPA concentrations ranging from 1.95×10^{-4} % to 6.25×10^{-4} % (w/v). (b) The standard curve indicating the linear correlation between IPA concentration and UV absorbance at 273 nm.