1 **Supplementary Methods**
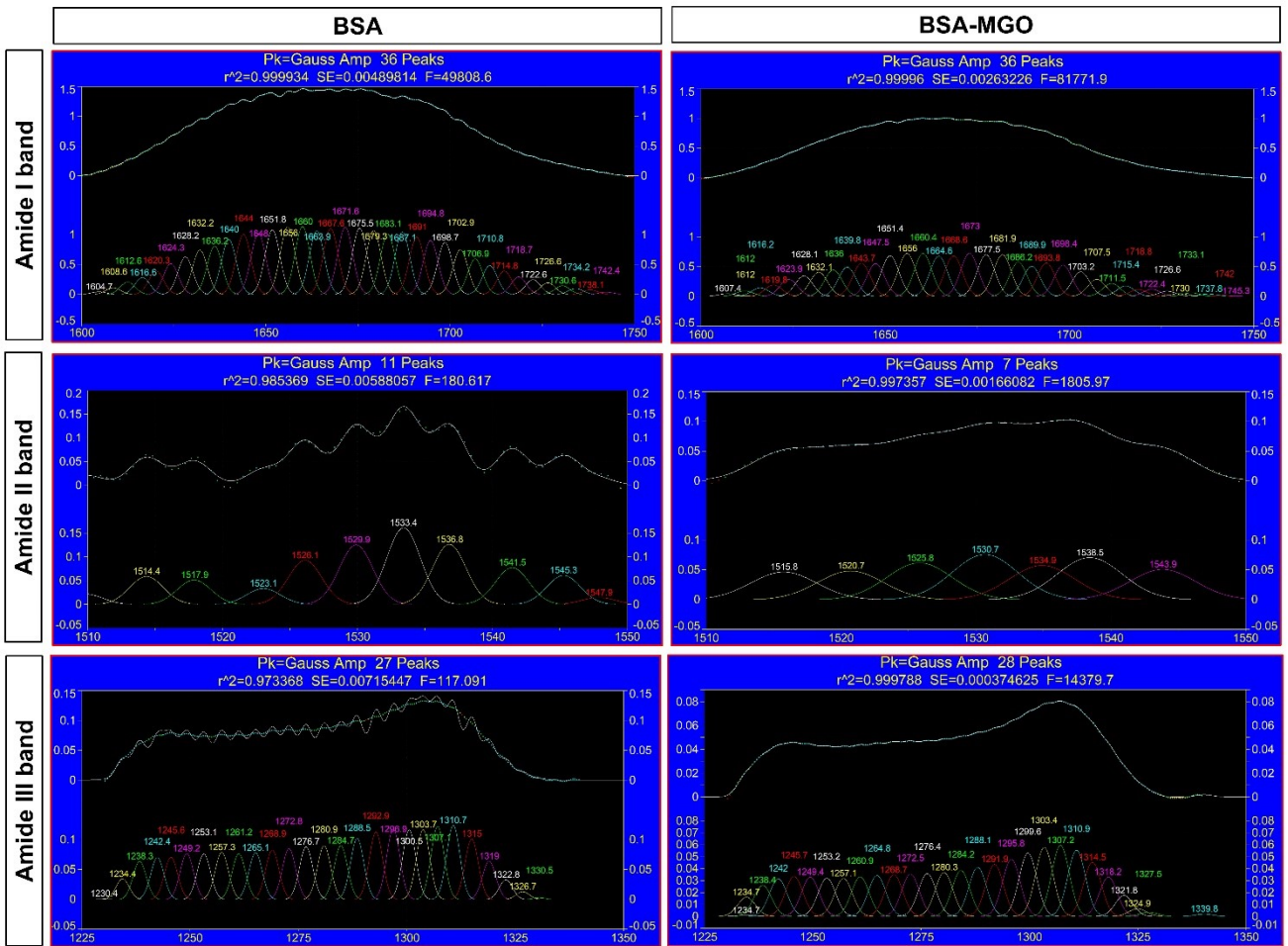
2 ***Detection of ROS level.*** The cellular ROS level was quantified by the DCFH assay with a

3 commercial kit (Beyotime Biotechnology, Shanghai, China). Briefly, Caco-2 cells were

4 seeded onto a 12-well plate (5×10^5 cells per well) and cultured for 24 h to allow cell

5 attachment. After removing the medium, the cells were treated with PBS, BSA (0.5 mg/mL),

6 or BSA-MGO (0.5 mg/mL) for another 24 h and then incubated with 2′,7′-

7 dichlorodihydrofluorescein diacetate (DCFH-DA, 10 μM) for 20 min at 37 °C in the dark. Cells

8 without any treatment served as the control, and cells treated with Rosup reagent and DCFH-

9 DA were used for the positive control. After incubation, the cells were washed with PBS three

10 times. Then, the cells were first observed and imaged by an Ortho-Fluorescent Microscopy

11 (Nikon eclipse C1, Nikon, Tokyo, Japan) with a NIKON DS-U3 imaging system. The

12 fluorescent density of the cell images was quantified by Image J software (version 1.53q,

13 National Institutes of Health, MD, USA).

15 **Supplementary Table S1** The full set of pathways identified based on GSEA.

Gene set	Description	ES	NES	*p*-value	FDR
HSA03040	Spliceosome	-0.58	-2.03	0	0.001
HSA03010	Ribosome	-0.43	-1.55	0	0.312
HSA03030	DNA replication	-0.55	-1.57	0.017	0.355
HSA00830	**Retinol metabolism**	**-0.45**	**-1.44**	**0.018**	**0.369**
HSA03430	Mismatch repair	-0.61	-1.58	0.019	0.452
HSA00983	Drug metabolism-other enzymes	-0.44	-1.41	0.027	0.425
HSA05323	Rheumatoid arthritis	-0.39	-1.32	0.027	0.585
HSA00020	Citrate cycle (TCA cycle)	-0.53	-1.49	0.028	0.316
HSA03018	RNA degradation	-0.41	-1.33	0.048	0.596

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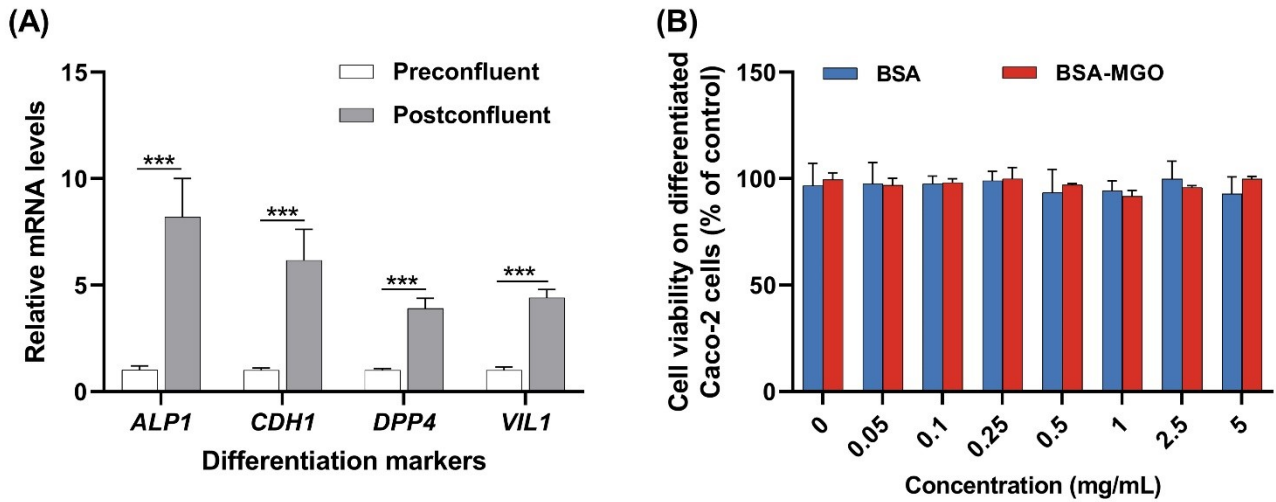
18 **Supplementary Figure S1** The second derivative spectra of BSA and BSA-MGO from their
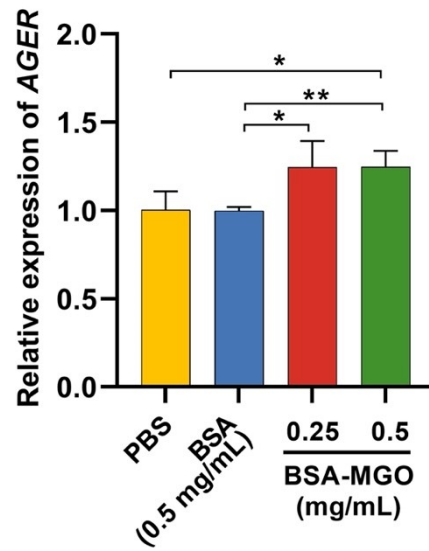
19 respective FI-TC spectra.

Supplementary Figure S2 Relative mRNA levels of differentiation markers in pre- and post-confluent Caco-2 cells (**A**); cell cytotoxicity of BSA and BSA-MGO on differentiated Caco-2 cells (**B**). *$p< 0.05$, **$p< 0.01$, and ***$p< 0.001$, Student's *t*-test or Mann-Whitney test.
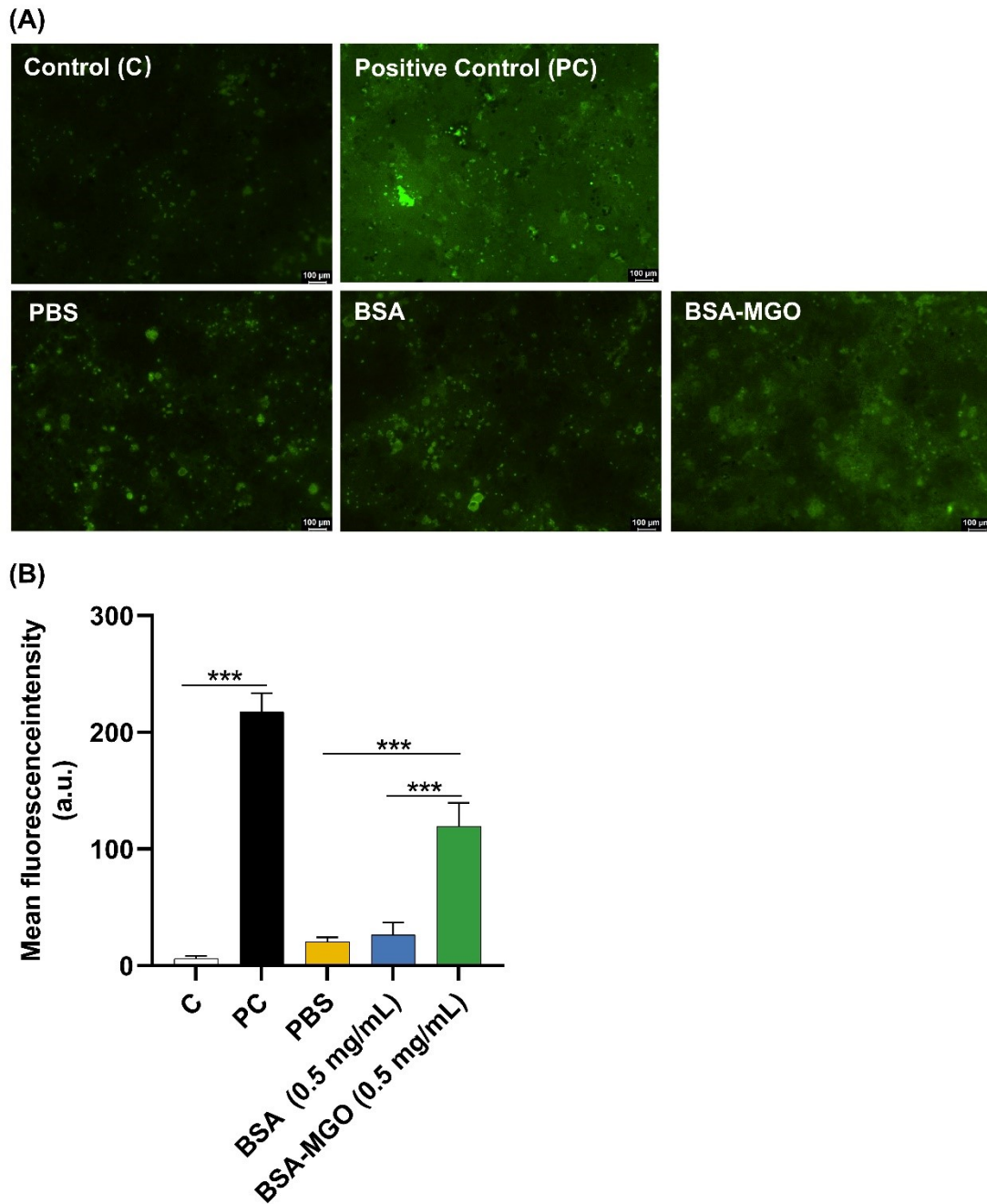
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Supplementary Figure S3 The mRNA expression levels of RAGE in Caco-2 cells upon treatment with samples. $*p < 0.05$, $**p < 0.01$, and $***p < 0.001$, Student's t-test or Mann-Whitney test.
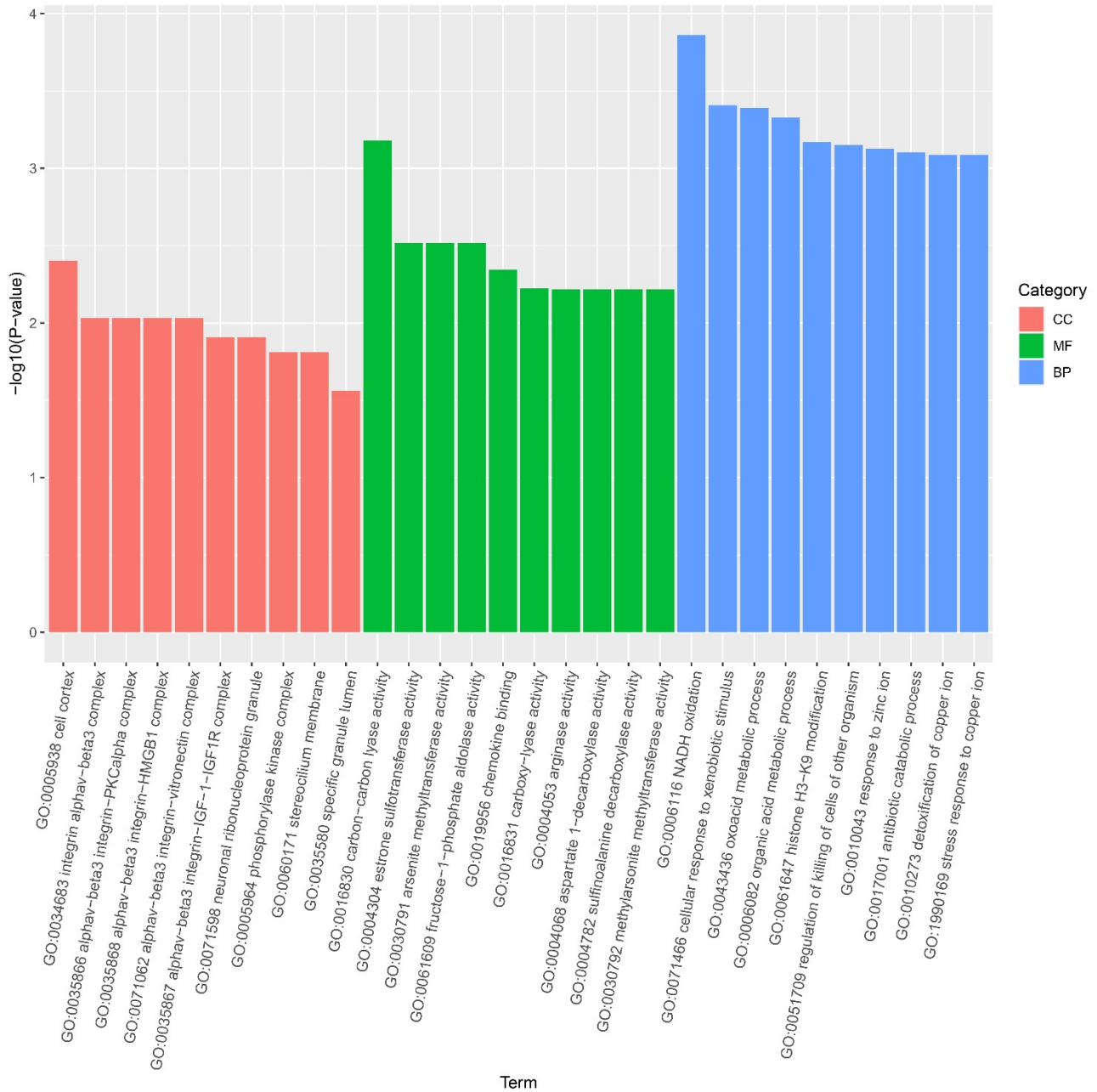

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46 **Supplementary Figure S4** Representative image (**A**) and mean fluorescence intensity (**B**)

47 of ROS levels in Caco-2 cells. *$p < 0.05$, **$p < 0.01$, and ***$p < 0.001$, Student's *t*-test or Mann-

48 Whitney test. Bars with different letters suggest statistical differences at $p < 0.05$, Tukey's

49 test.

(A)

(B)

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52 **Supplementary Figure S5** GO analysis identifying DEGs in biological processes (BP),

53 cellular components (CC), and molecular functions (MF).

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