Supplementary Information

Properties of *Ophioglossum vulgatum* L. extract Pickering emulsion stabilized by carbon dot and its potential use in cosmetics

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Fig.S1 the herb *Ophioglossum vulgatum* L.

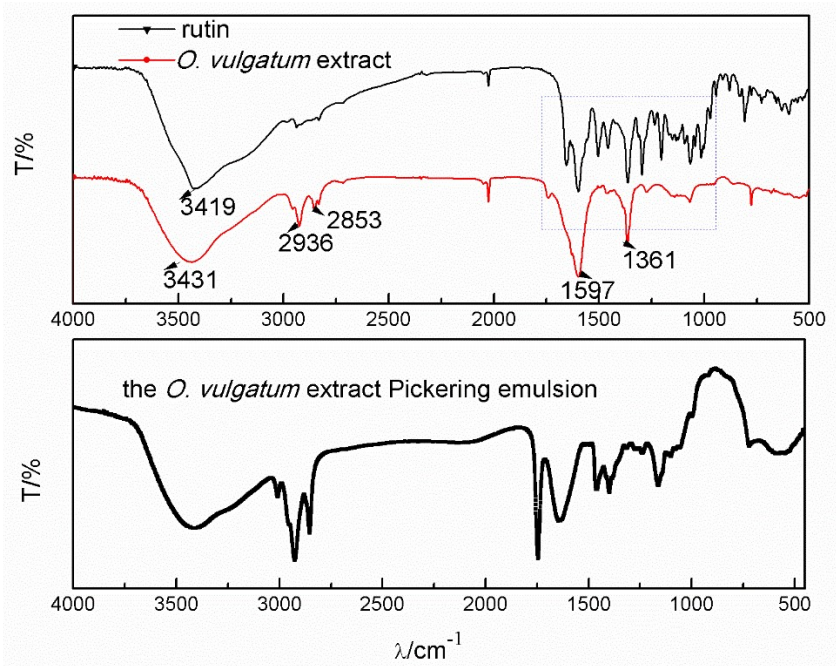

Fig.S2 FTIR spectrum of *O. vulgatum* extract, rutin and the *O. vulgatum* extract Pickering emulsion

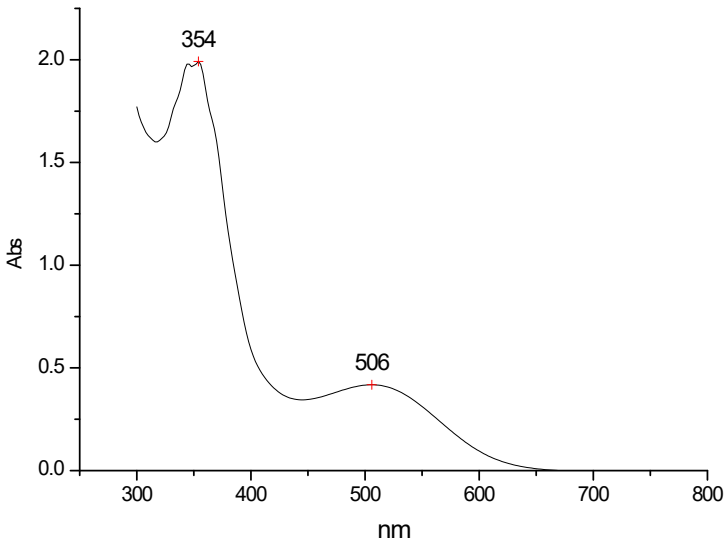

Fig.S3 the wavelength of Flavonoid determination: rutin as a standard flavonoid

The method described for determining the flavonoid content in the O. vulgatum extract using UV spectrophotometry and the sodium nitrite-aluminum nitrate-sodium hydroxide color method is well-documented and follows established principles in flavonoid analysis. A total of 1 mg rutin was added to a 10 mL volumetric flask and mixed with 0.5 mL 5% sodium nitrite (w/v). After a six-minute interval, 10% 0.5 mL aluminum nitrate (w/v) was added, followed by 4mol/L 4 mL sodium hydroxide solution after another six-minute interval. Water was then added until the total volume was 10 mL, and the solution was shaken well and then left for 15 min. Absorbance was tested using UV spectrophotometry and two peaks was obtained in Fig.S3. The absorption peak is UV absorption at 354 nm and visible absorption at 510 nm. So combined with the literature, 510 nm was used as the test wavelength at here and water was used as the blank control.

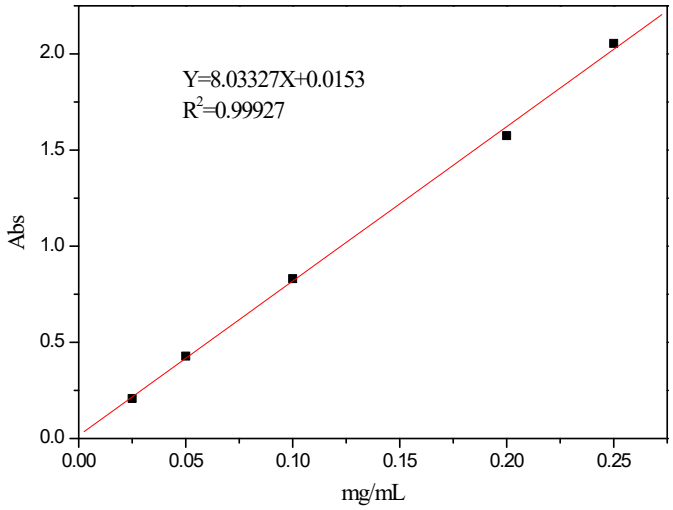

Fig.S4 the calibration curve using rutin as a standard flavonoid

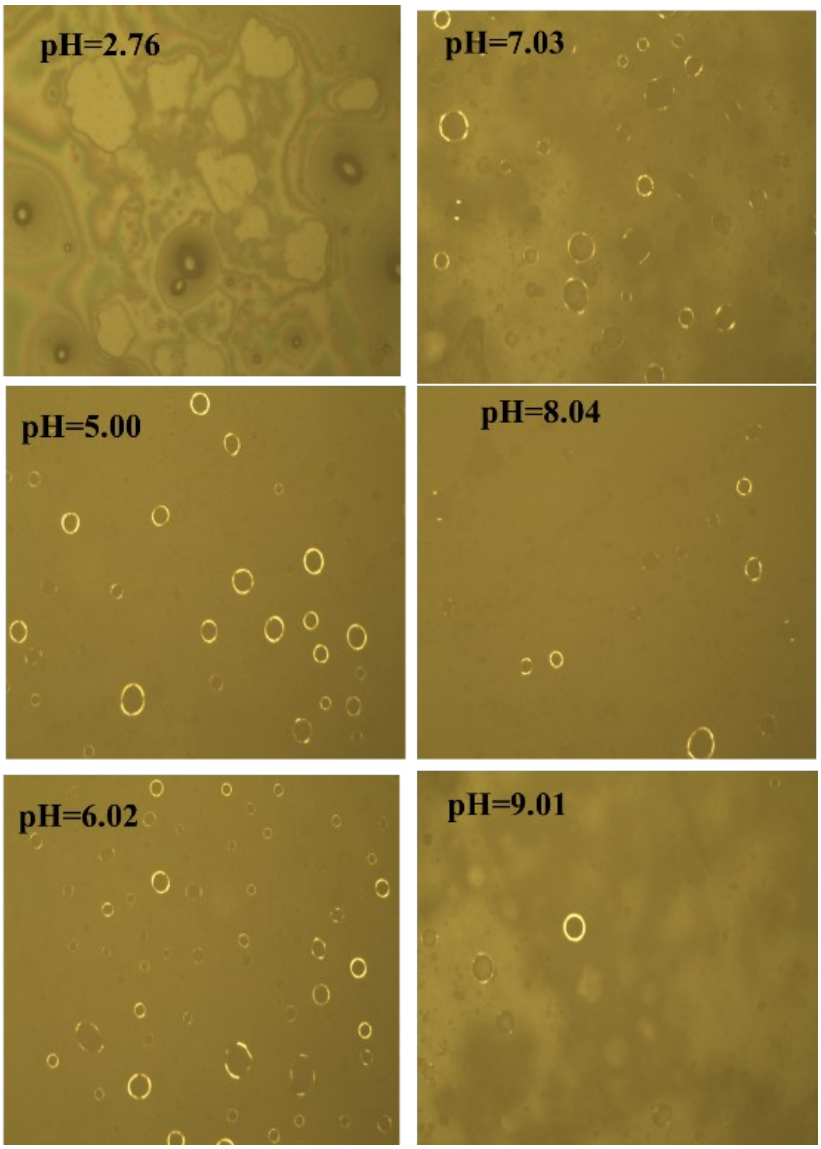

Fig.S5 Optical micrographs of the prepared Pickering emulsion varied with pH

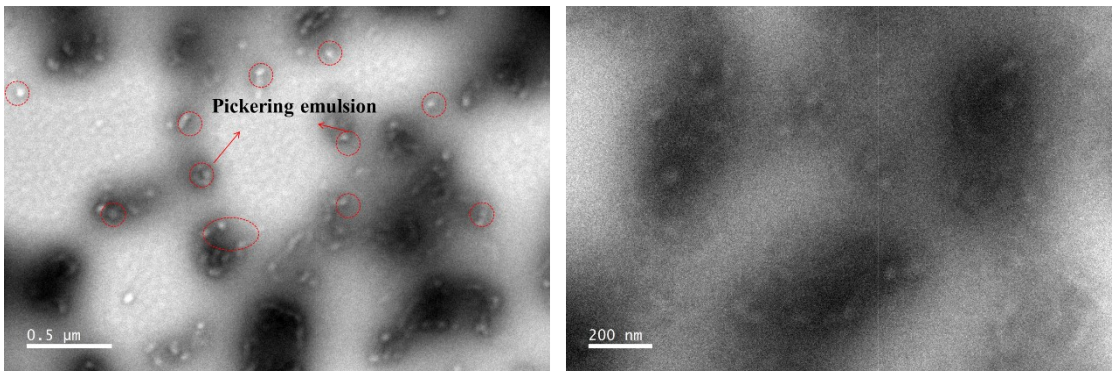

Fig.S6 TEM images of the *O. vulgatum* extract Pickering emulsion

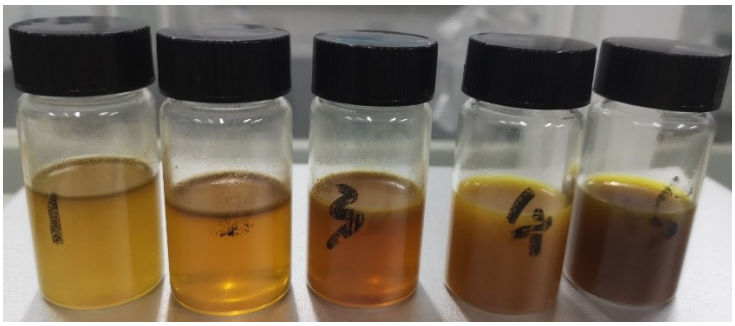

Fig.S7 the appearance of the prepared *O. vulgatum* extract Pickering emulsion on the first day (Day 1)

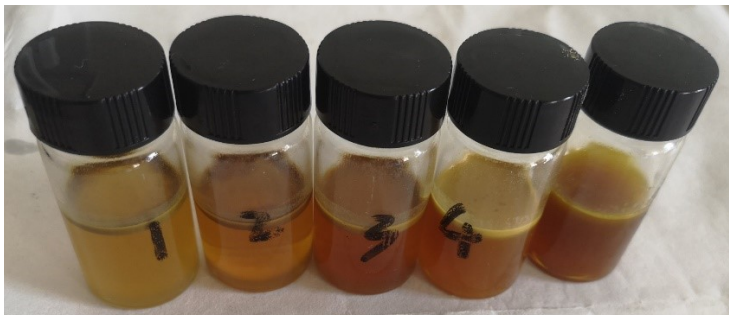

Fig.S8 the appearance of the prepared *O. vulgatum* extract Pickering emulsion on the second day (Day 2)

Fig.S9 the appearance of the prepared *O. vulgatum* extract Pickering emulsion on the fifth day (Day 5)

Dispersion stability: Figures S7-S9 showed the digital photographs of the glass bottles containing the *O. vulgatum* extract Pickering emulsion. It was noticed that after one day (24 h) of the storage, there was no obvious changes. After two days, the emulsion also kept the original state. This reflected the carbon dot was a good stabilizer to stabilize Pickering emulsion. On the fifth day, the emulsion was observed to be separated largely and oil-water interface could be clearly observed, possibly due to carbon dots aggregating during storage, disrupting the expected interfacial activity. Of course, more stability data need to be further investigated.

References

1. D. Yu, G.-D. Li, W.-X. Liu, Y.-M. Li, Zh. -P. Song, H.-L. Wang, F.-X. Guan and X.-Sh. Chen, *Colloids and Surfaces A*, 2019,**563**,310-317.

2. Gupta, M.; Hawari, H.F.; Kumar, P.; Burhanudin, Z.A.; Tansu, N. *Nanomaterials* **2021**, *11*, 623. https://doi.org/10.3390/nano11030623.