Supplementary Information (SI) for RSC Advances.
This journal is © The Royal Society of Chemistry 2025

Electronic Supplementary Information for

Superior Solubility of Anhydrous Quercetin and Polymer Physical Mixtures Compared to Amorphous Solid Dispersions

Xu Ma, [a,b] *Hong Su,* [b] *Yongming Liu,* [c] *Fenghua Chen,* [b,*] *and Rongrong Xue* [b,*]

[a] College of Chemistry and Materials Science, Fujian Normal University, Fuzhou 350117, Fujian, China.

[b] School of Resources and Chemical Engineering, Sanming University, Sanming 365004, Fujian, China.

[c] School of Education and Music, Sanming University, Sanming 365004, Fujian, China.

Corresponding Authors
**(F. C.) E-mail: fenghuachen@fjsmu.edu.cn.*
**(R. X.) E-mail: rongrongxue@fjsmu.edu.cn.*

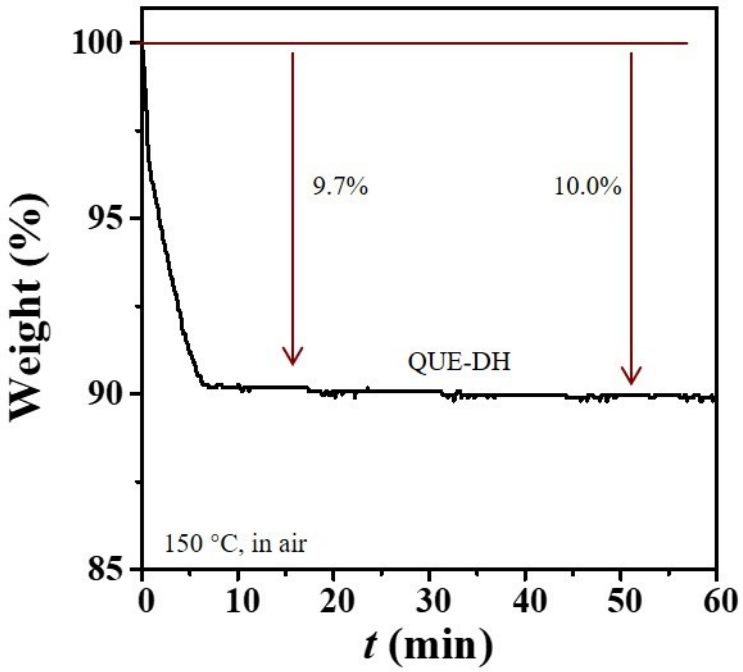

Figure S1. Macro-thermogravimetric curve of QUE-DH at 150 °C in air. The weight loss reaches 9.7% in 15 minutes, which is the same as that of QUE-DH heated at 100 °C for 1 hour. The dehydration product is QUE-AH. The weight loss is up to 10.0% in 50 minutes, which indicates that a small amount of QUE molecules undergo degradation. Because the weight loss in the process was measured by macroscopic thermogravimetric, a 0.3 % difference is enough to judge the occurrence of degradation.

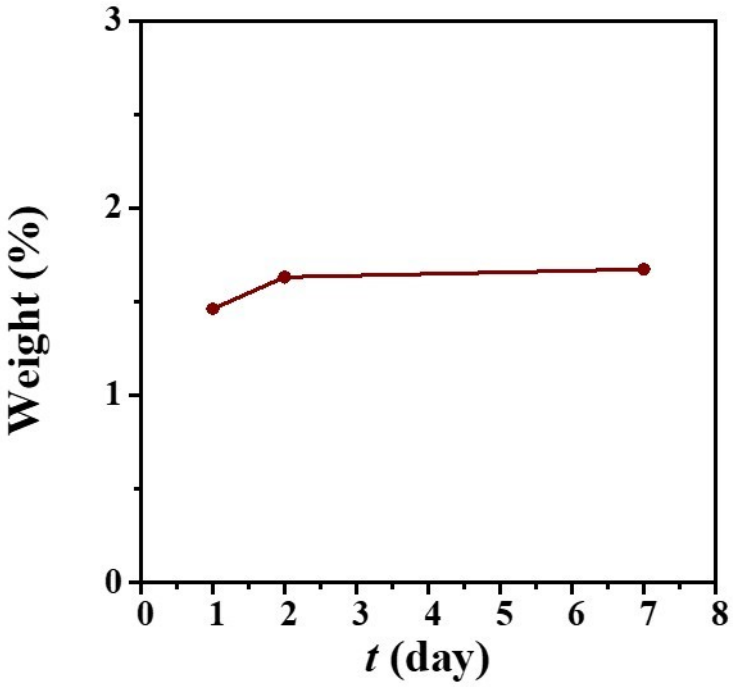

Figure S2. Hydration process of QUE-AH at room temperature and ~ 60% humidity.

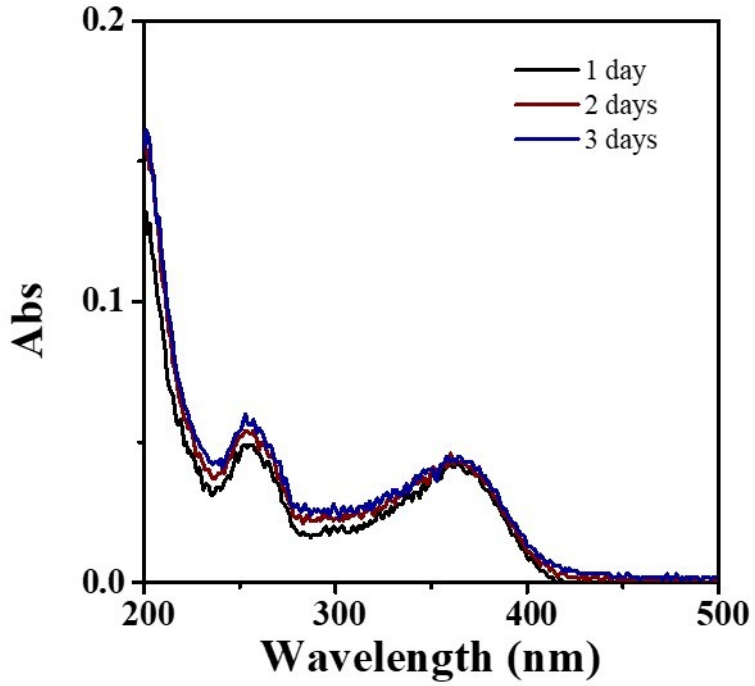

Figure S3. UV-vis spectra of QUE aqueous solution with different storage time.

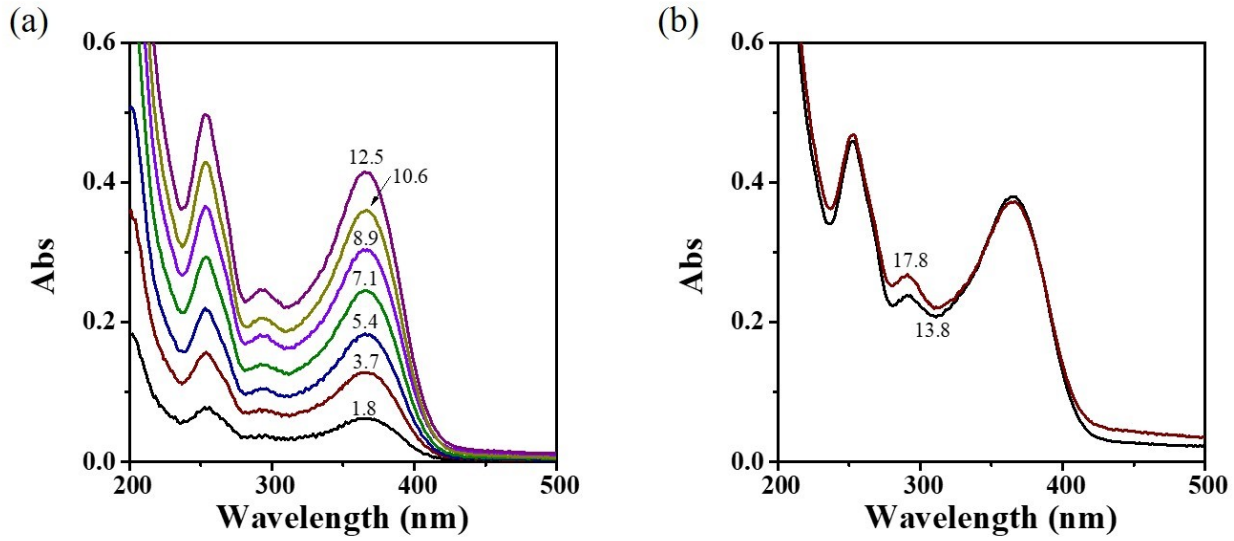

Figure S4. UV-vis spectra of the QUE aqueous solutions in the concentration range of (a) 1.8 – 12.5 μg·ml^{-1} and (b) 13.8 – 17.8 μg·ml^{-1}. The UV-vis spectra exhibit a good gradient increase in the concentration range of 1.8 – 12.5 μg·ml^{-1}. The absorption of QUE aqueous solutions with concentration of 13.8 and 17.8 μg·ml^{-1} decreased significantly at 367 nm, while the baseline absorption increased significantly at 400 – 500 nm, indicating the occurrence of recrystallization.

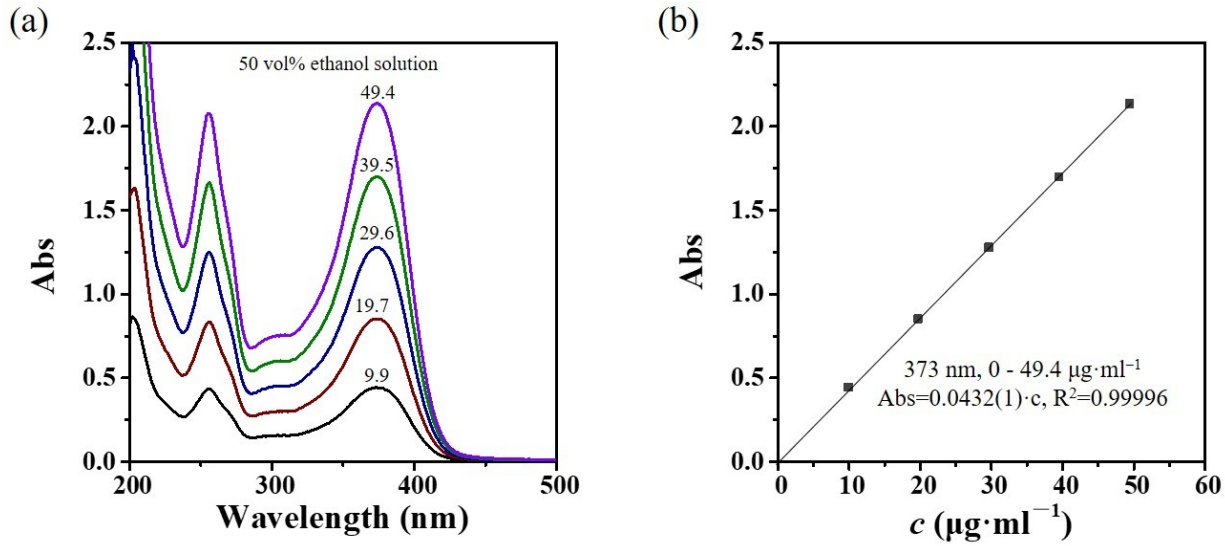

Figure S5. Working curve establishment of QUE 50 vol% ethanol solutions in the concentration range of 0 – 49.4 μg·ml^{-1}. (a) UV-vis spectra, (b) the fitted working curve.

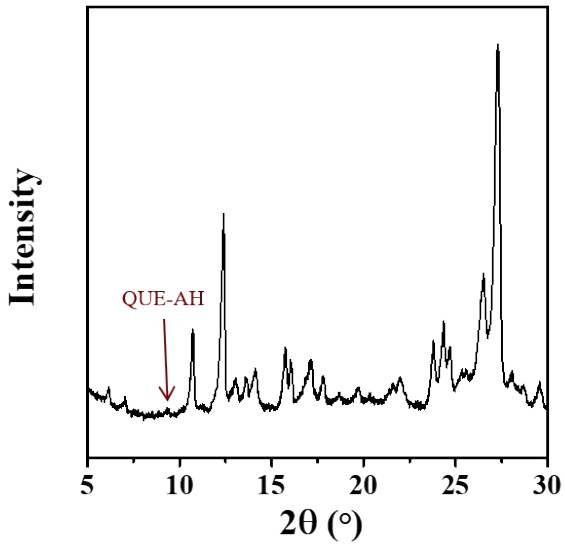

Figure S6. PXRD pattern of commercial QUE-AH stored for years. The most PXRD peaks are related to QUE-DH, and the peak of QUE-AH is marked.

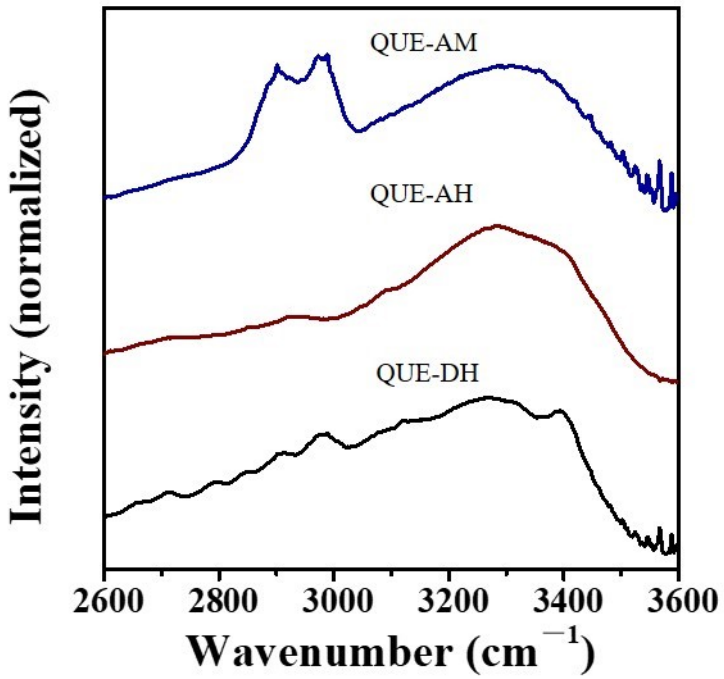

Figure S7. IR spectra of QUE polymorphs in the range of 2600 - 3600 cm^{-1}.

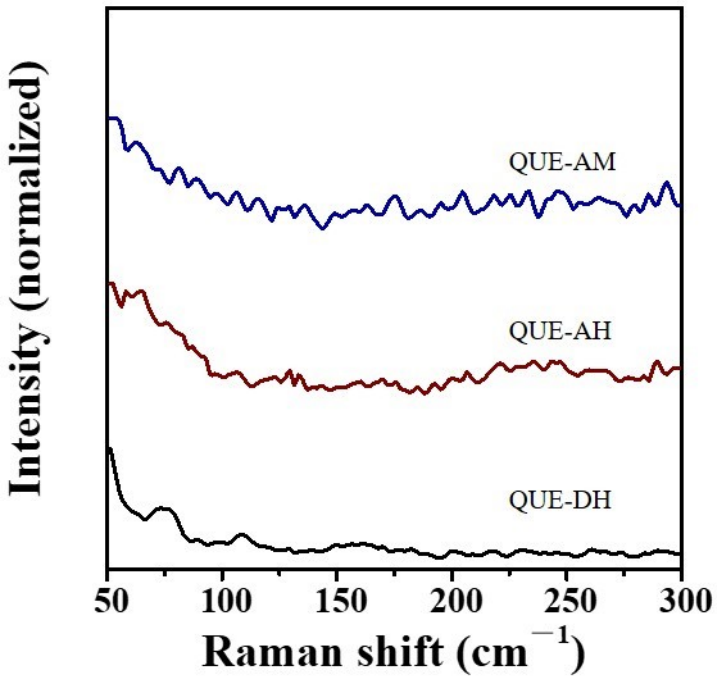

Figure S8. Low-frequency Raman spectra (in the range of 50 - 300 cm^{-1}) of QUE polymorphs.

Table S1. Raman bands (cm^{-1}) and assignments of quercetin (QUE).[1]

QUE polymorphs			assignments
QUE-AM	QUE-AH	QUE-DH	
519	521	522	$\gamma(A) + \gamma(C) + \delta(COH)_A$
598	597	603	$\gamma(OH)_{C3} + \gamma(A) + \gamma(C) + \gamma(OH)_{A5}$
1319	1321	1327	$\nu(A) + \nu(C) + \delta(CH)_{A6} + \nu(C\text{-}O)_{A5}$
1558	1553	1547	$\delta(CH)_{B2'} + \nu(B) + \nu(C\text{-}O)B_{4'}$
1612	1613	1606	$\nu(B) + \delta(CH)_{B5'} + \nu(C{=}O)$

1. Hanuza, J.; Godlewska, P.; Kucharska, E.; Ptak, M.; Kopacz, M.; Mączka, M.; Hermanowicz, K.; Macalik, L., Molecular structure and vibrational spectra of quercetin and quercetin-5'-sulfonic acid. *Vibrational Spectroscopy* **2017,** *88*, 94-105.

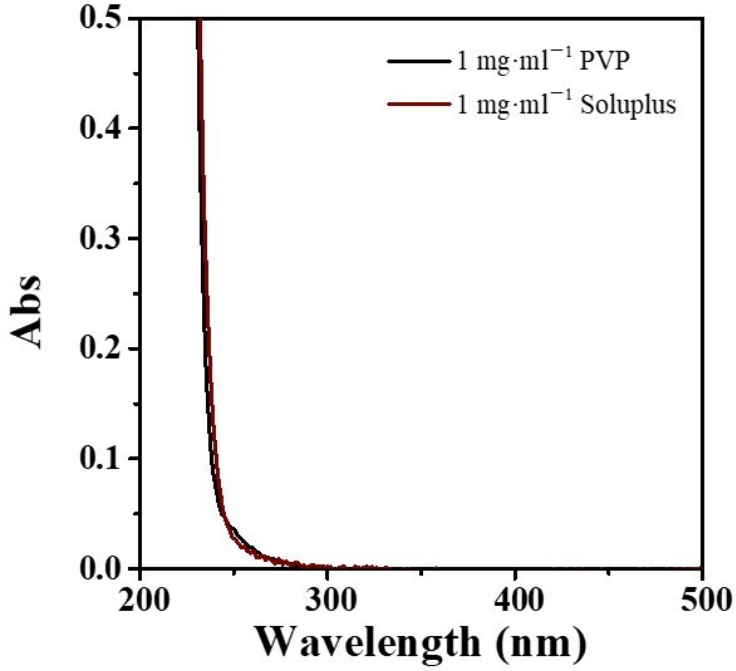

Figure S9. UV-vis spectra of 1 mg·ml^{-1} PVP and 1 mg·ml^{-1} Soluplus solutions.

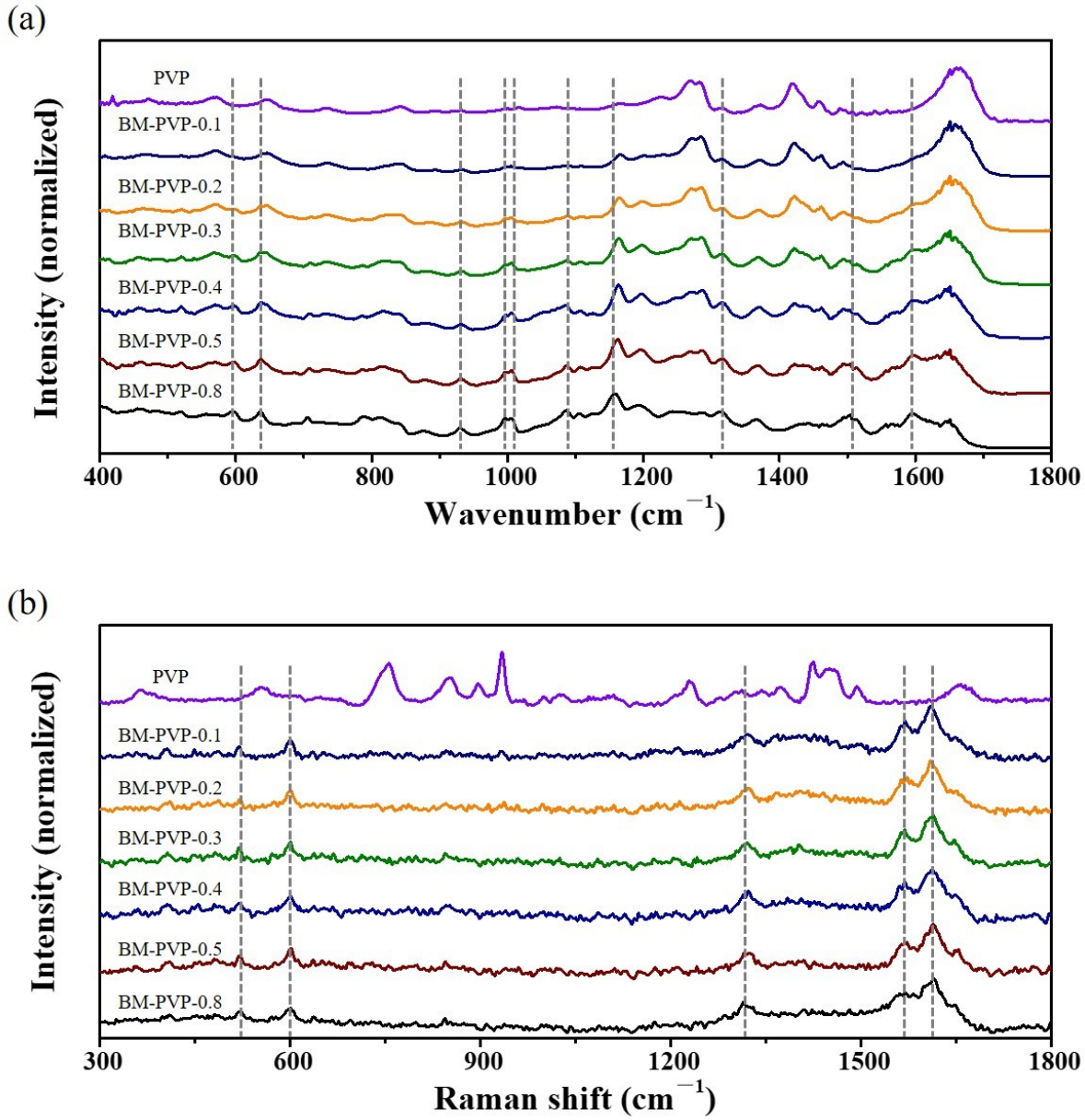

Figure S10. (a) IR and (b) Raman spectra of QUE ASDs with PVP (BM-PVP-ω_{QUE}) and PVP.

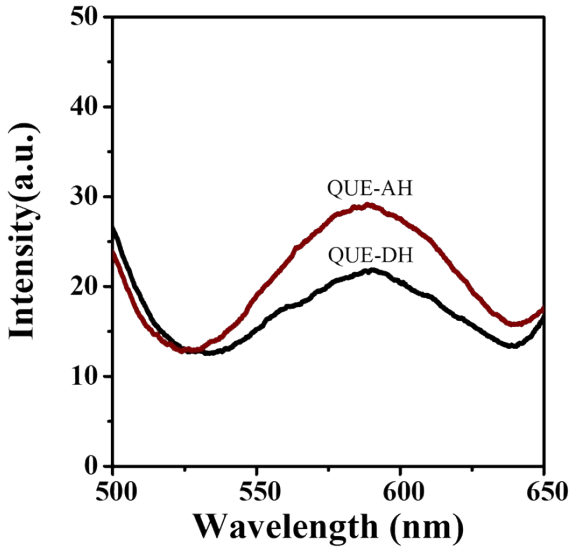

Figure S11. Fluorescence spectra of QUE-DH and QUE-AH. (λ_{ex}=350 nm)