Electronic Supplementary Material (ESI) for New Journal of Chemistry.

Supporting Information

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Characterization

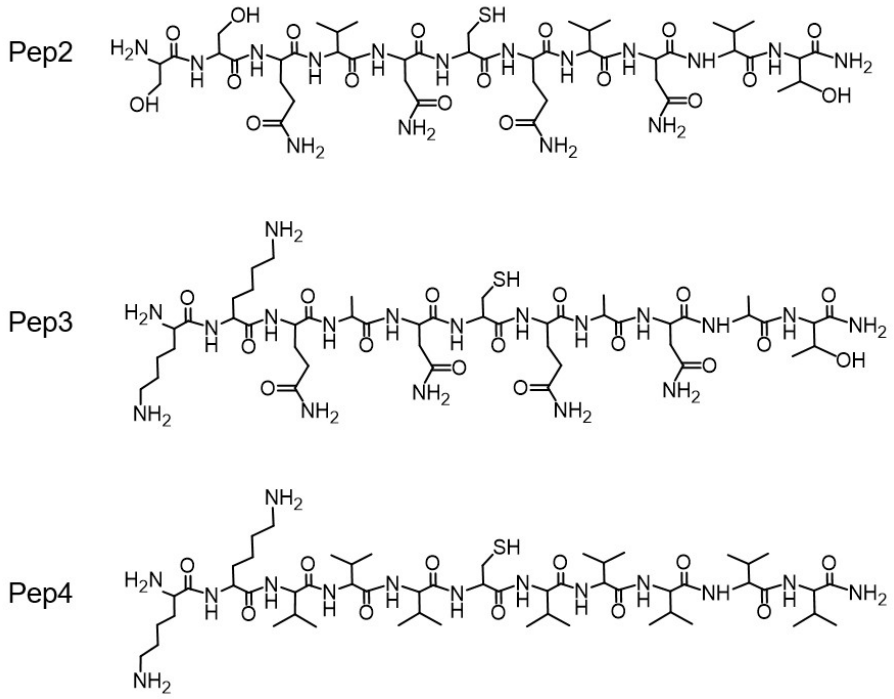


Fig. S1 Molecular structures of the synthesized peptides (Pep2-Pep4).

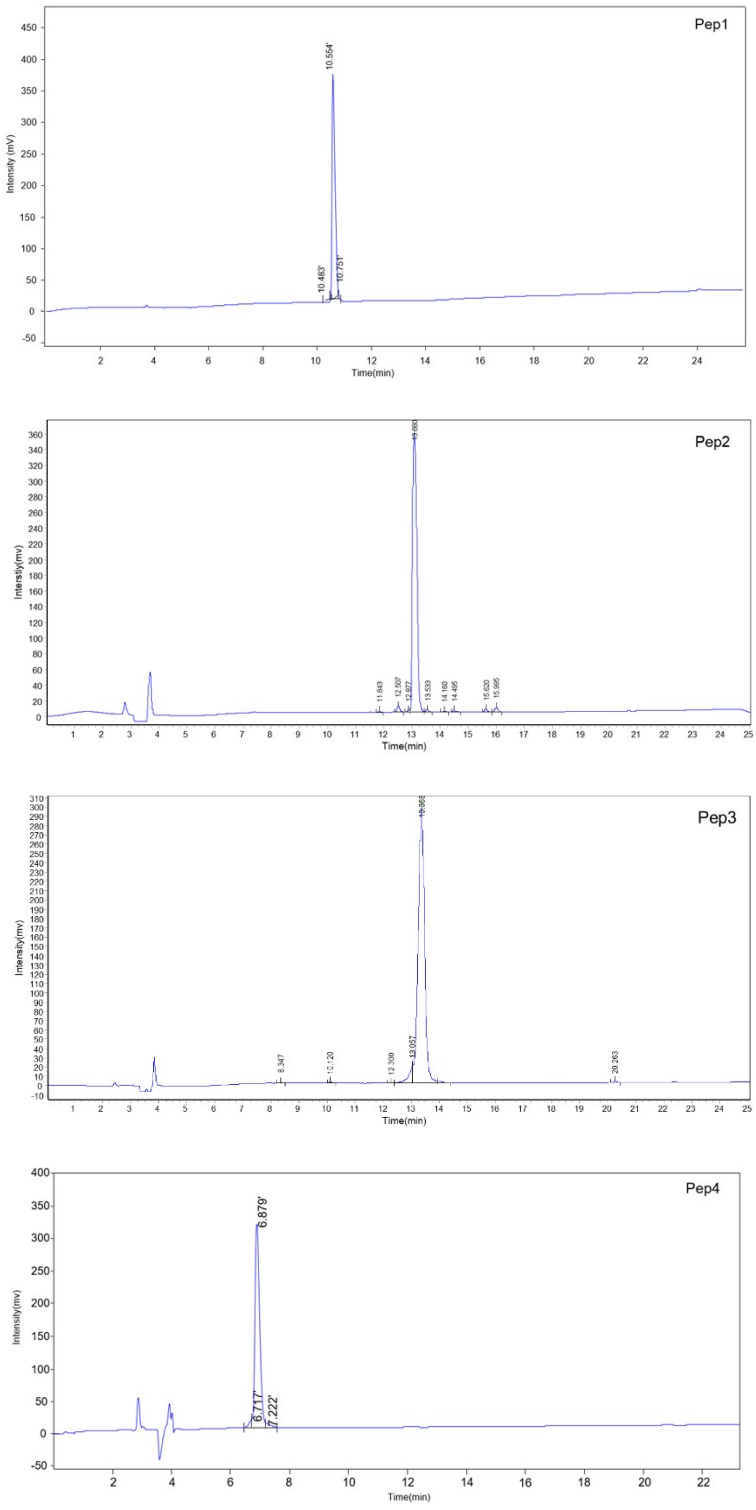


Fig. S2 HPLC profiles of the synthesized peptides form Pep1 to Pep4

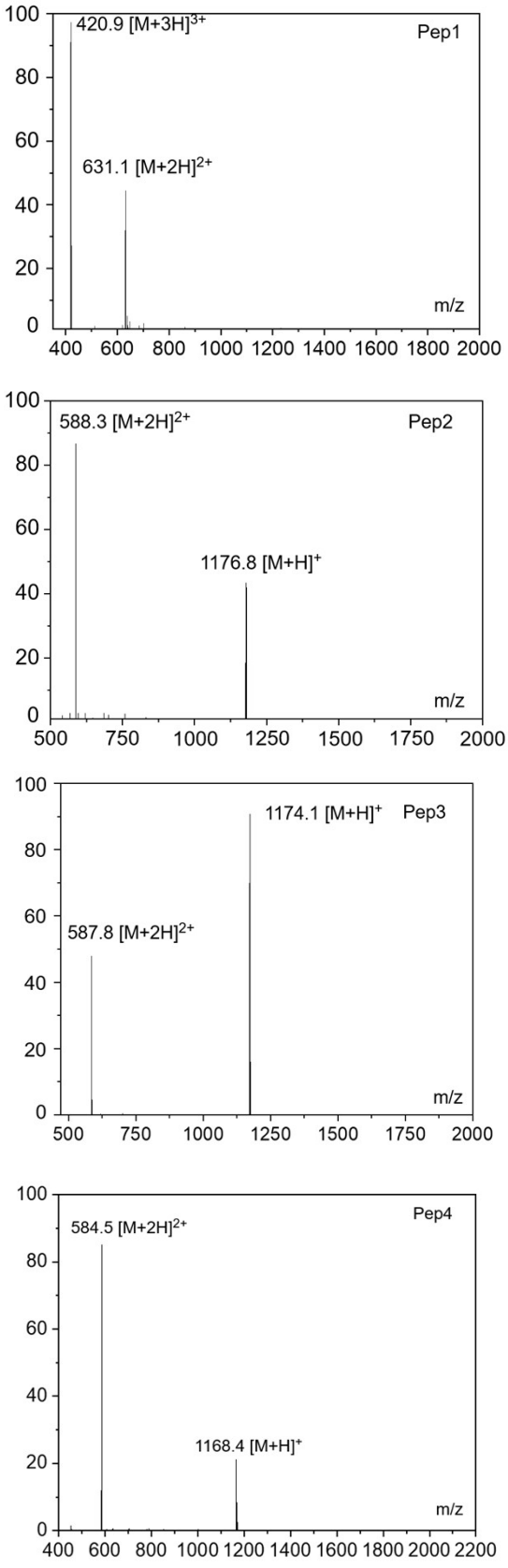
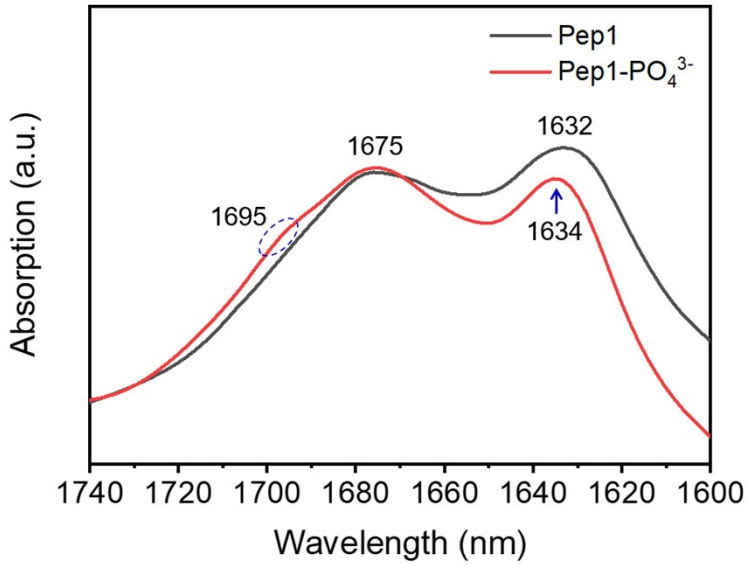


Fig. S3 ESI-MS data of the short peptides form Pep1 to Pep4



Figs S4. FTIR spectra of the lyophilized peptide samples of Pep1 and Pep1-PO_4^{3-}complex.

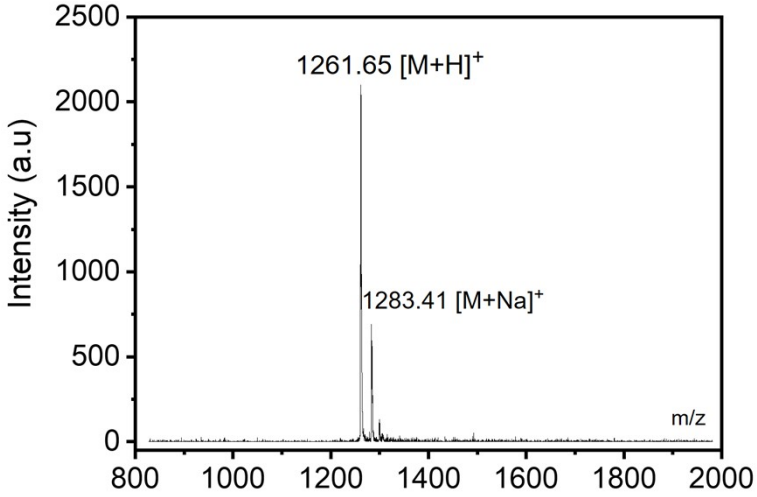


Fig. S5 MALDI-TOF-MS data of the Pep1 obtained from the aqueous solution of Pep1-PO_4^{3-}

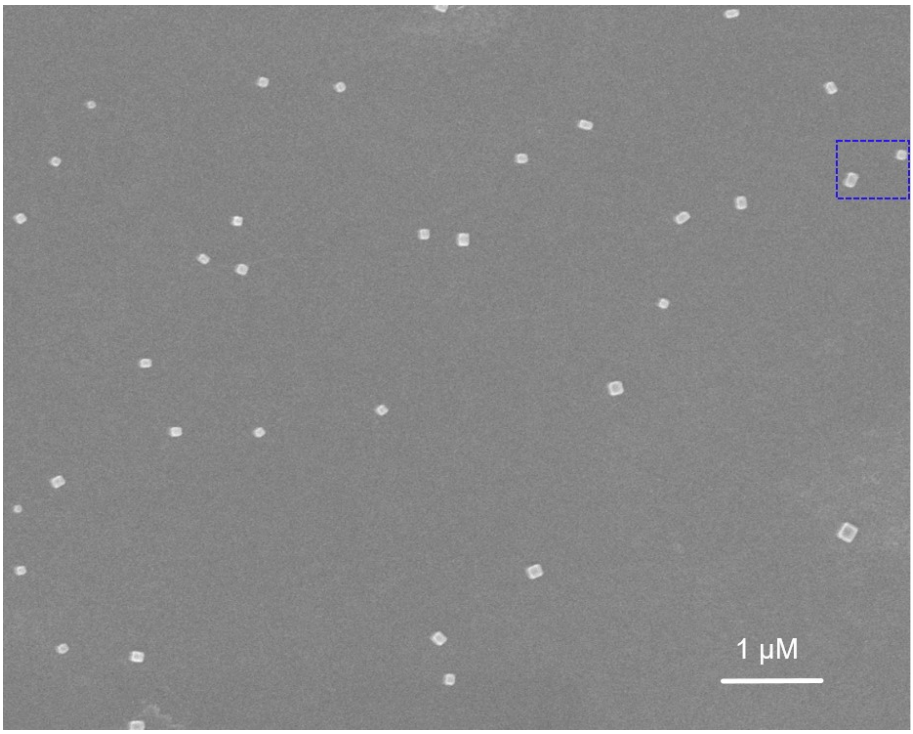


Fig. S6 SEM image of Pep1-PO_4^{3-} nanoblocks (the enlarged images in blue area presented in Fig 3d in main text)

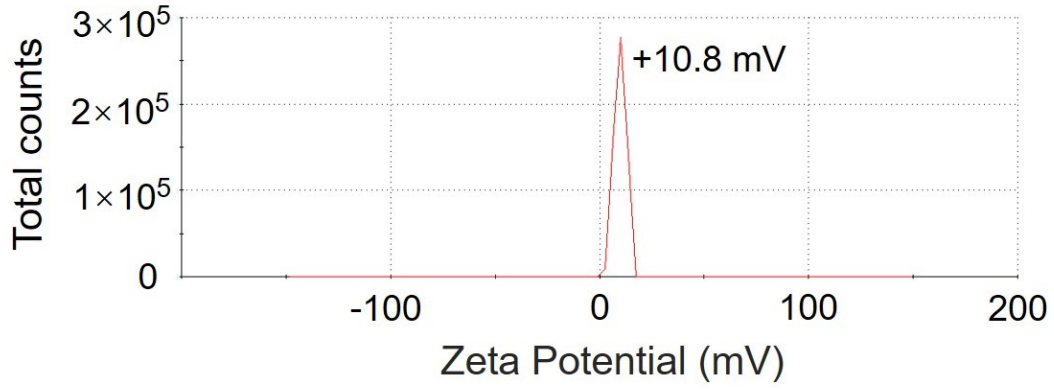


Fig. S7 Zeta potential of Pep1 alone in aqueous solution.

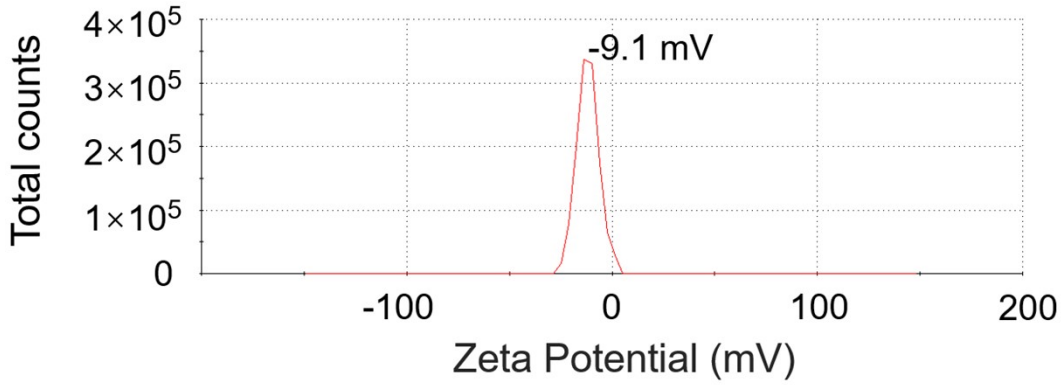


Fig. S8 Zeta potential of Pep1-PO_4^{3-} assembly in aqueous solution.

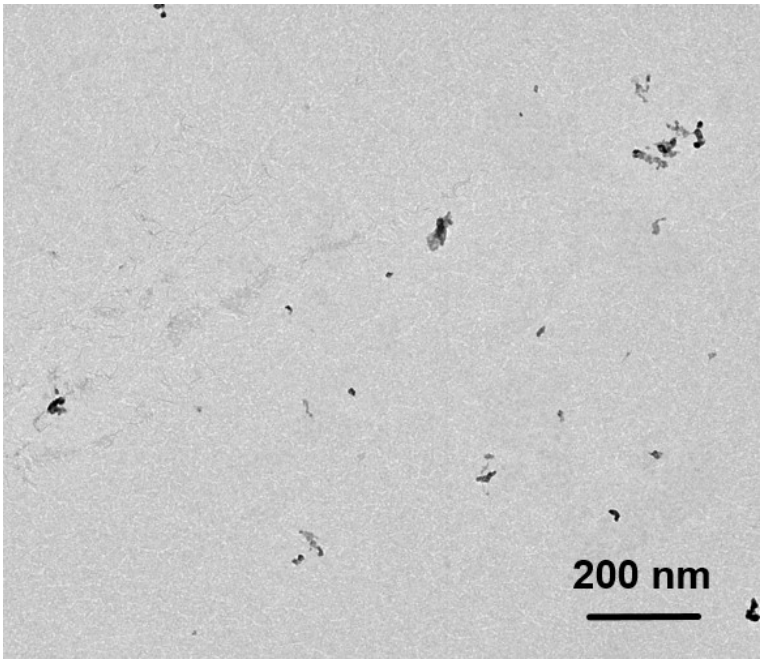


Fig. S9 TEM image prepared from the aqueous samples of Pep2-PO_4^{3-} complexes. (The Pep2 without lysine residues mixed with PO_4^{3-} was not form the uniform nanostructures)

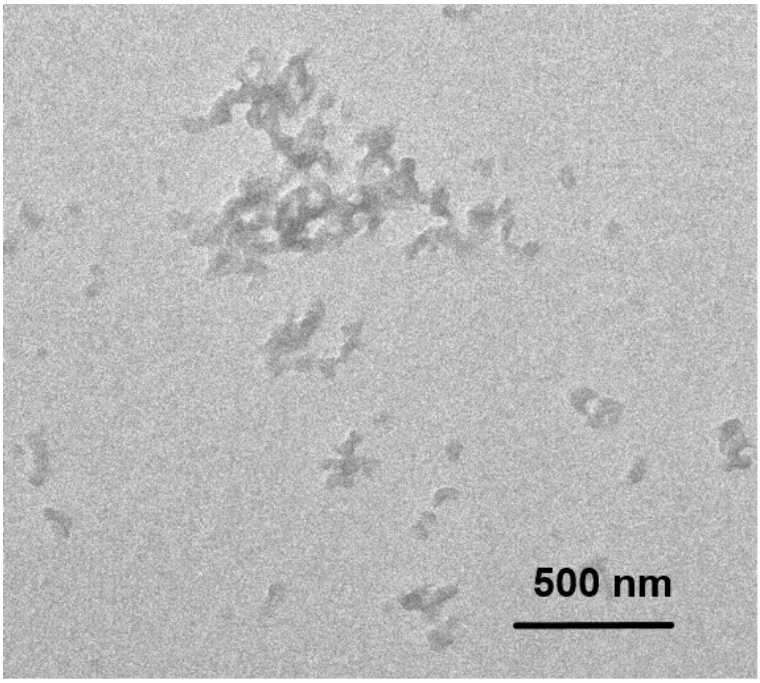


Fig. S10 TEM image prepared from the aqueous sample of Pep3-PO_4^{3-} complexes.

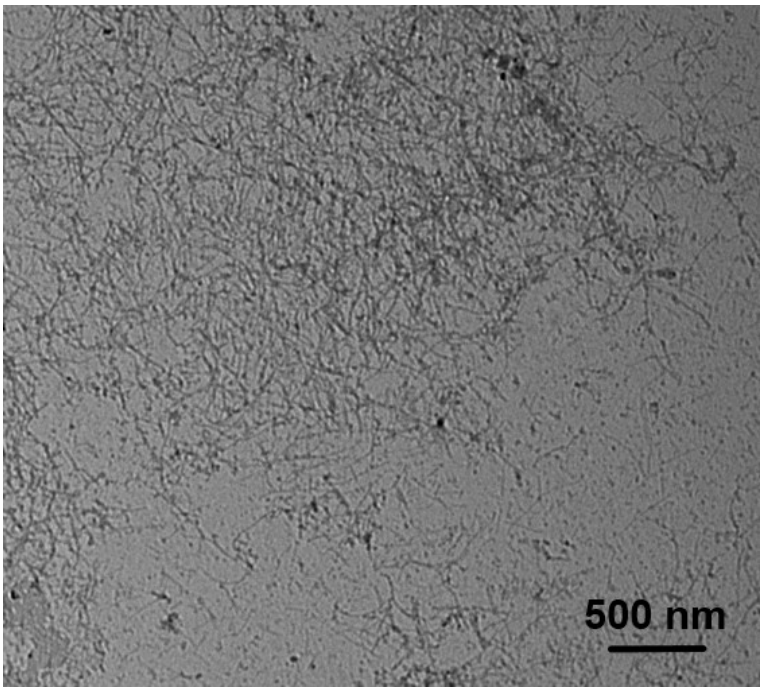


Fig. S11 TEM image prepared from the aqueous sample of Pep4-PO_4^{3-} complexes.

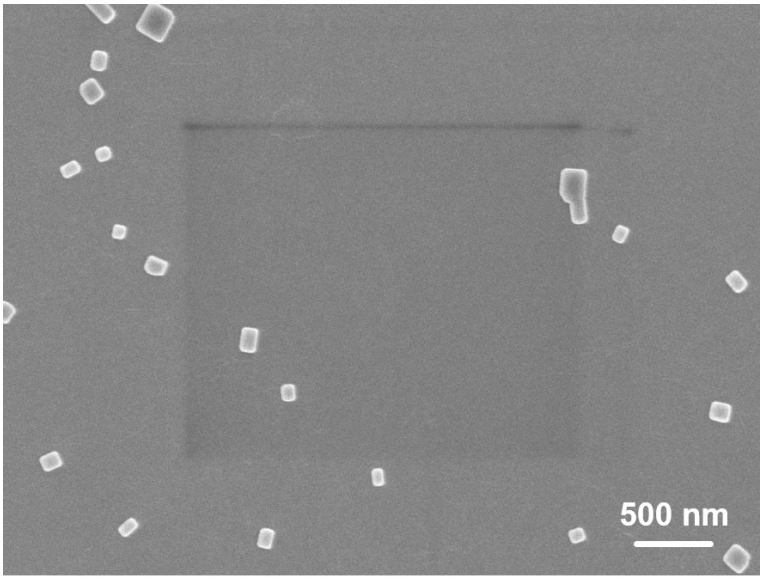


Fig. S12. SEM image of Pep1-PO_4^{3-} nanoblocks after loading curcumin.

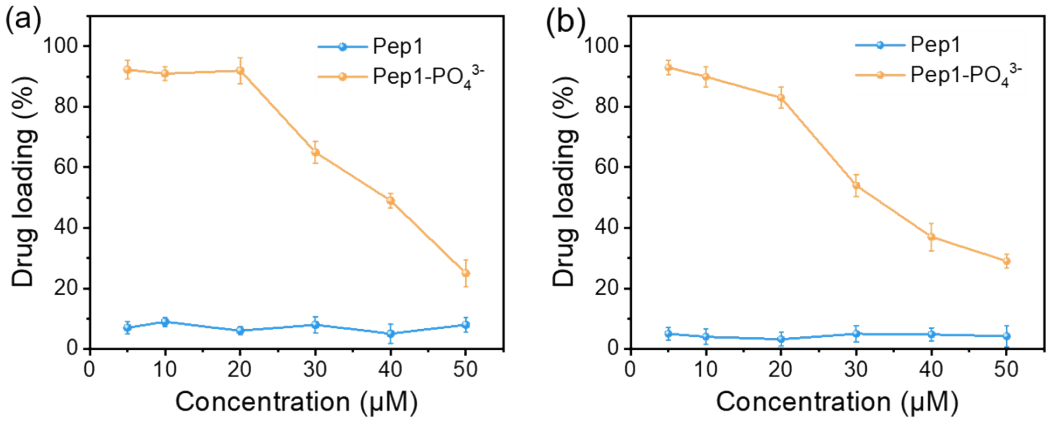


Fig. 13 (a) Drug loading profiles of Pep1 and Pep1-PO_4^{3-} nanoblocks loading different concentration of curcumin. (b) Drug loading profiles of Pep1 and Pep1-PO_4^{3-} nanoblocks loading different concentration of PI. (Measured on a UV-vis spectrophotometer at 425 nm for curcumin drug, and at 537 nm for PI drug)

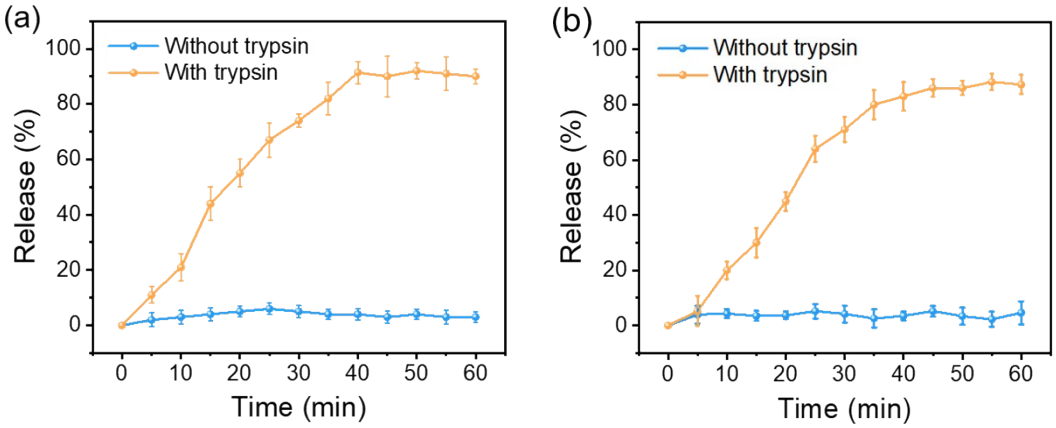


Fig.14 (a) Drug release profiles of Pep1-PO_4^{3-} nanoblocks loading curcumin in the presence or absence of trypsin. (b) Drug release profiles of Pep1-PO_4^{3-} nanoblocks loading PI in the presence or absence of trypsin. (Measured on a UV-vis spectrophotometer at 425 nm for curcumin drug, and at 537 nm for PI drug, the concentration of trypsin is 2μg ml^{-1}) [1, 2]

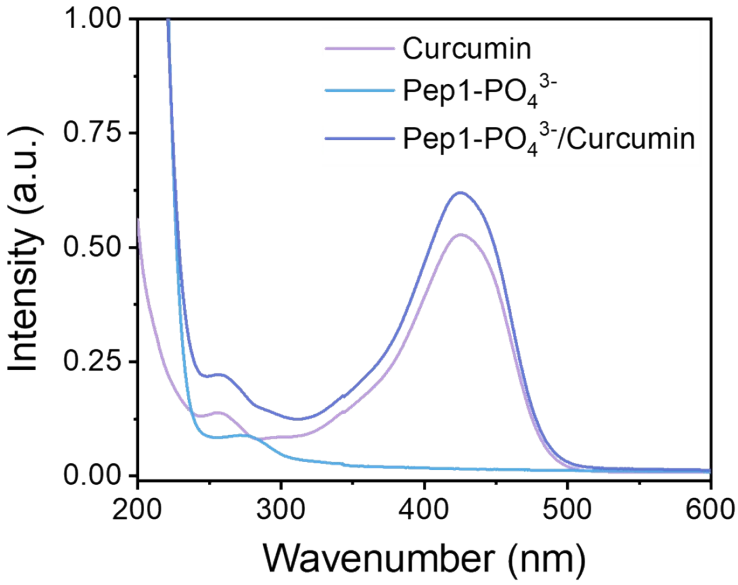


Fig. S15. UV-vis spectrophotometer of individual curcumin, Pep1 and Pep1-PO_4^{3-} loading curcumin. (The concentration of curcumin was kept at 20 μM)

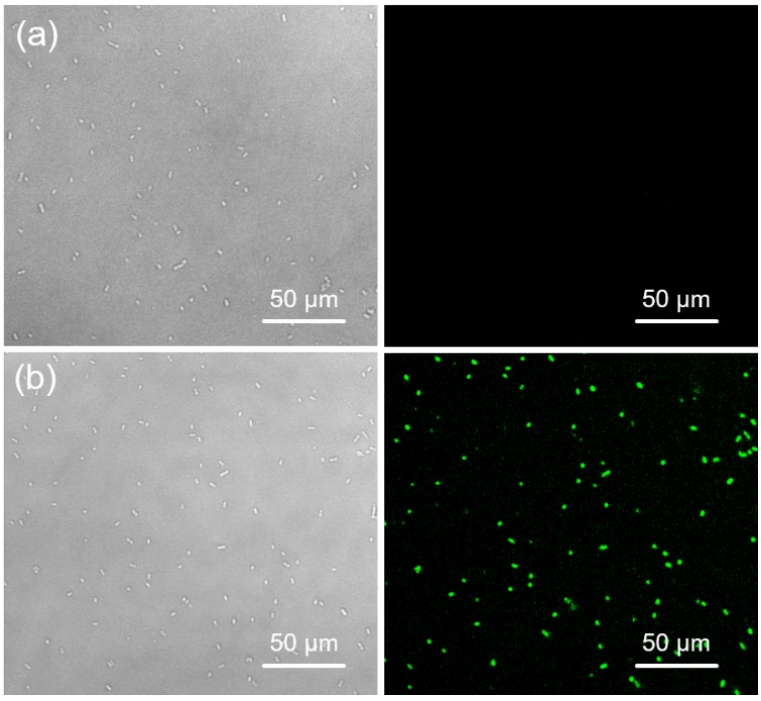


Fig. S16. (a) Pep1 and (b) Pep1-PO_4^{3-} nanoblocks served as a vehicle for delivering curcumin into *E*. coli cells.

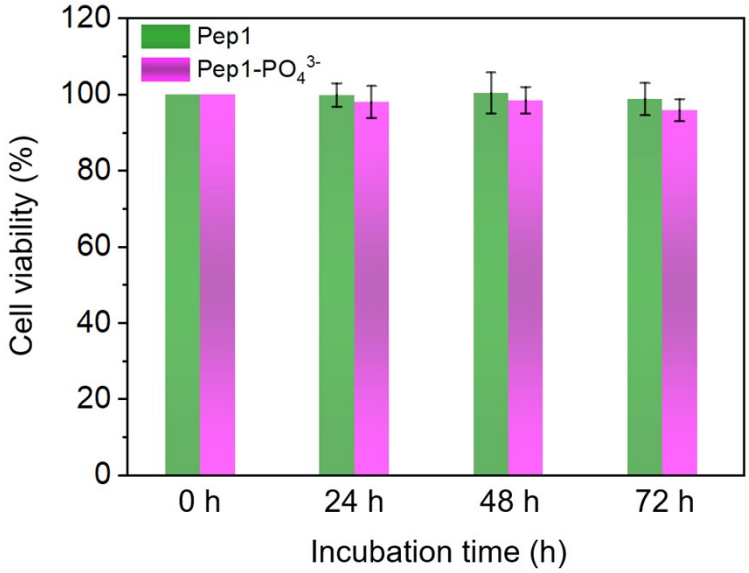


Fig. S17. L-929 cell (mouse fibroblasts) viability after treatment with Pep1 and Pep1-PO_4^{3-}. Cells were treated with each compound for 72 h, and the viability was evaluated by MTT assay. Data are expressed as a percentage of live cells.

Reference

1. M. Retout, Z. Jin, J. Tsujimoto, Y. Mantri, R. Borum, M. N. Creyer, W. Yim, T. He, Y. Chang, and J. V. Jokerst, *ACS Appl. Mater. Interfaces* **2022**, *14*, 52553–52565.
2. A. S. Law, M. C. Yeung and V. W. Yam, *ACS Appl. Mater. Interfaces*, **2017**, *9*, 41143-41150.