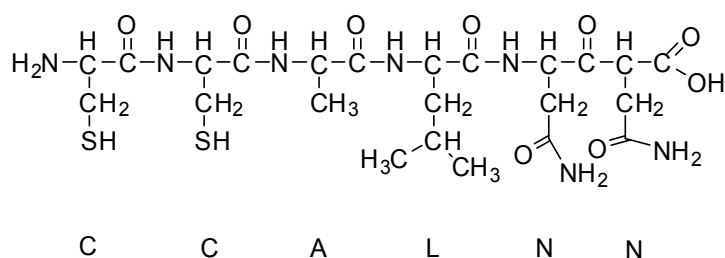


## Supporting Information

### Chemicals

Tellurium powder (99.999%),  $\text{CdCl}_2 \cdot 2.5\text{H}_2\text{O}$ , sodium borohydride ( $\text{NaBH}_4$ ), were obtained from Sinopharm Chemical Reagent (China) and were used as capping agents without additional purification. Peptide was purchased from was synthesized by the ChinaPeptides Co., Ltd. (Shanghai, China). All chemicals used were of analytical grade or of the highest purity available. All solutions were prepared using Milli-Q water (Millipore) as the solvent.

The chemical structure of peptides is as follows:



### Experiments

Synthesis of peptide-QDs. The preparation of peptide-QDs by one-pot route has been depicted in the following experiment. Sodium borohydride ( $\text{NaBH}_4$ ) reacted with tellurium powder at a molar ratio of 2:1 in deionized water at ice-water bath to form sodium hydrogen tellurium ( $\text{NaHTe}$ ), which lasted for about 4~5 h. A mixture of  $\text{CdCl}_2$  (1.25 mM) and different concentrations of peptides was loaded in a three-neck flask and adjusted the pH using 1.0 M NaOH solution. Then, fresh  $\text{NaHTe}$  was added to 400  $\mu\text{l}$  of the above solution at a 2 ml centrifuge tube followed by placing in the oven with different time and gradually cooling to the room temperature. The rough

product was purified by the methods of ultrafiltration.

Characterization. UV-vis absorption spectra data were acquired using Shimadzu UV-2550 spectrophotometer. Fluorescence was recorded by Shimadzu RF-5301 fluorescence spectrophotometer. Transmission electron micrographs (TEM) image was conducted on a JEOL-JEM 2100 electron microscope operating at an accelerating voltage of 200 kV. The crystal phase of the peptide-QDs was characterized by Brucker D8 Discover X-Ray Diffractometer (XRD). FT-IR spectra were obtained by Nicolet-Magna-IR 550 infrared spectrometric analyzer. X-ray photoelectron spectroscopy (XPS) was carried out using a Kratos Ltd. Xsam-800 X-ray photoelectron spectrometer (UK).