# Supporting Information

*for*

# Recognition-before-labeling strategy for sensitive detection of lung cancer cells with quantum dots-aptamer complex

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**Abbreviations:** QDs, quantum dots; lib, random DNA library; PBS, phosphate buffered saline; TCA, human tongue cancer cells; TGA, thioglycolic acid; S/B, signal to background ratio; FITC, fluorescein isothiocyanate.

## 1. Characterization of biotin-QDs by Transmission Electron Microscopy (TEM)

The inorganic size of biotin-QDs was determined using a FEI Tecnai G20 TEM operating at 200 kV. One drop of a dilute sample of biotin-QDs in water was placed onto a Formvar coated copper grid, allowed to settle for 60 seconds, and wicked away using an absorbent tissue. The TEM image indicated biotin-QDs were uniform and dispersed well.

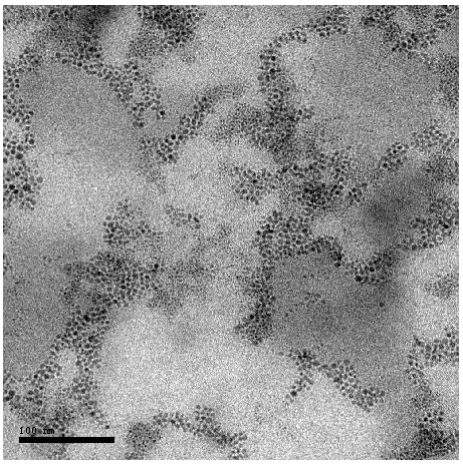


Figure S1 The TEM image of biotin-QDs.

## 2. Characterization of QDs-S11e conjugates

To verify successful coupling of S11e to biotin-QDs, agarose gel electrophoresis was conducted. 10 μL of biotin-QDs and QDs-S11e with the same concentration were mixed with 2 μL of loading buffer, respectively. The electrophoresis was conducted for 1 h with the conditions of 1% agarose gel, 100 V voltage. Finally, the result was analyzed using gel image analysis system. As shown in Figure S2, biotin-QDs and QDs-S11e both migrated to anode, but the electrophoresis velocity of QDs-S11e was obviously faster than biotin-QDs. The differences in the mobility of biotin-QD versus QD-S11e indicated that S11e were indeed attached to the QD surface.

In addition, the zeta potentials of biotin-QDs and QDs-S11e measured were -5.84±7.29 mV and -20.71±7.32 mV, respectively (Figure S3). This indicated that negative charges of QDs-S11e were more than biotin-QDs, which further confirmed S11e were conjugated to biotin-QDs successfully.

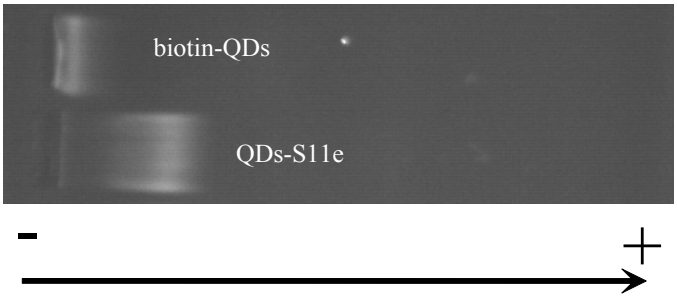


Figure S2 Electrophoresis analysis of biotin-QDs and QDs-S11e conjugates.

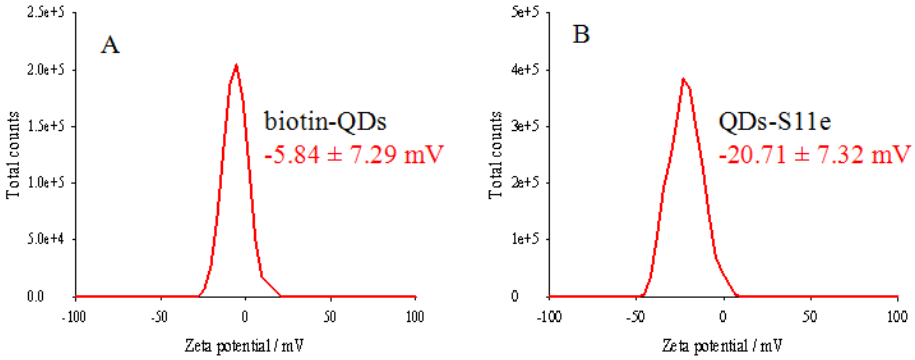


Figure S3 Potential characterization of biotin-QDs (A) and QDs-S11e conjugates (B).

### 3. Stability comparisons between biotin-QDs and QDs-S11e conjugates

As can be seen in Figure S4, there were some aggregates when S11e were conjugated to QDs. In addition, the fluorescence intensity of QDs-S11e conjugates also faded to some extent. These results indicated QDs-S11e conjugates become unstable a little compared with biotin-QDs.

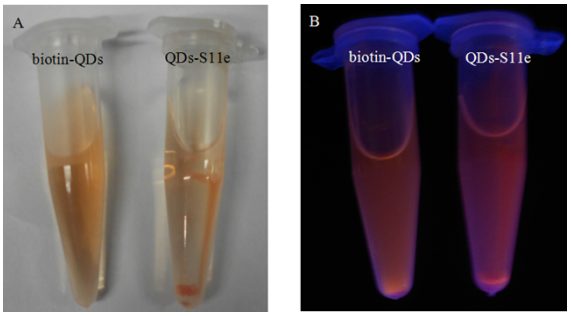


Figure S4 The bright photograph (A) and fluorescence image (B) of biotin-QDs and QDs-S11e conjugates.

### 4. Optimization of QDs concentration

QDs concentration was an important factor when used to label cancer cells. If their concentration was too high, great nonspecific absorption would occur, conversely the

specific recognition may be incomplete. As presented in Figure S5, after different QDs concentrations were incubated with A549 cells, fluorescence intensity increased along with the increase of QDs concentration. And the maximum difference between positive and control samples was at 300 nM, indicating that the optimal concentration of QDs was 300 nM.

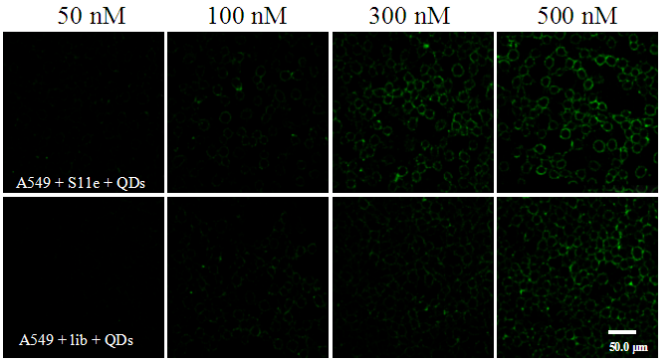


Figure S5 Fluorescence images of different QDs concentrations incubated with A549 cells.

## 5. Optimization of incubation time

The effect of incubation time was performed in the range from 10 to 90 min. As shown in Figure S6, with an increasing incubation time, the fluorescence intensity increased and tended to a maximum at 60 min. Longer incubation time did not enhance the fluorescence intensity.

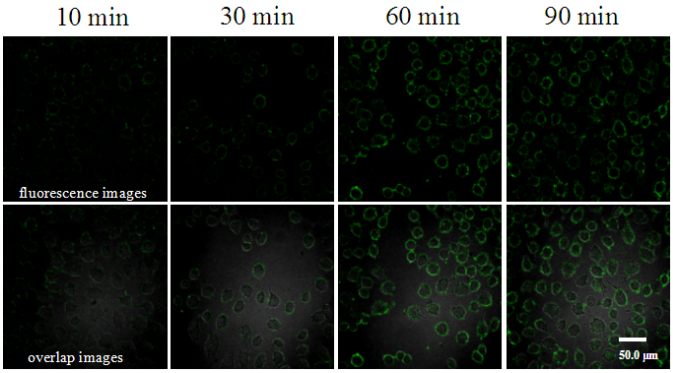


Figure S6 Fluorescence images of different incubation time with QDs.