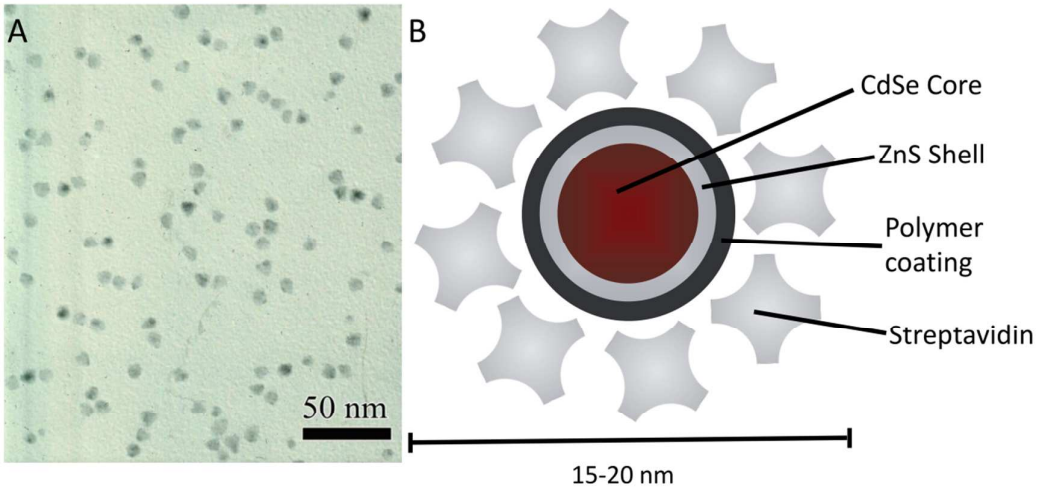


**Figure S1.** (A) TEM image and (B) structure of QD-605 streptavidin $QD_{SA}$ conjugate.

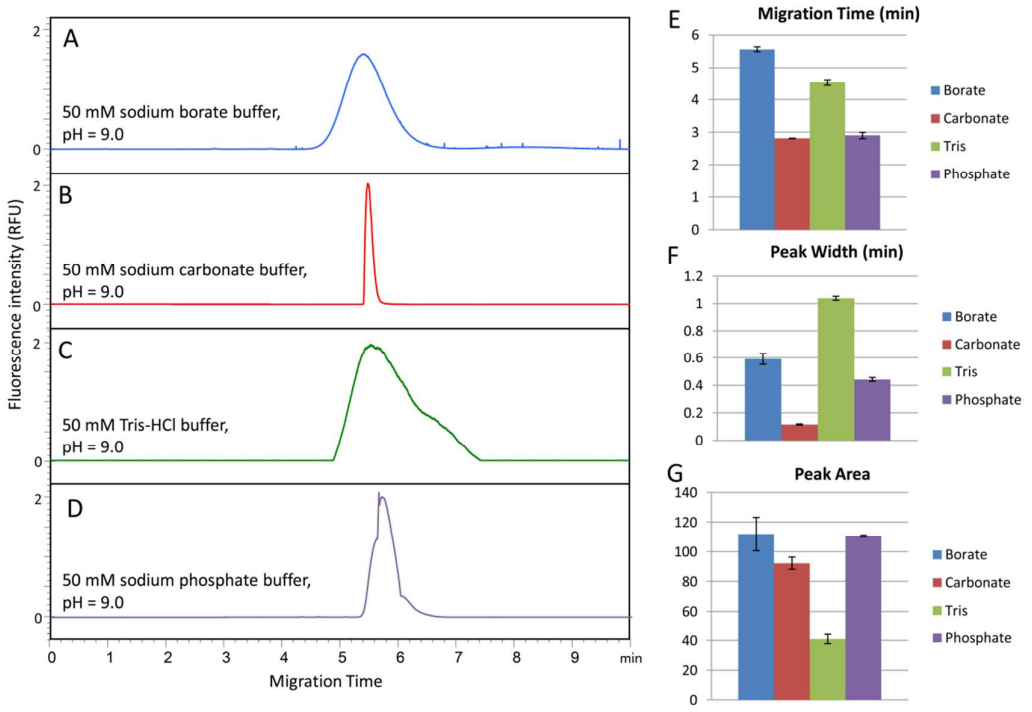


**Figure S2.** Optimization of CE buffer species for QD-605 streptavidin conjugate. Tested operating buffer species were (A) 50 mM sodium borate buffer, pH 9.0, (B) 50 mM sodium carbonate buffer, pH 9.0, (C) 50 mM Tris-HCl buffer, pH 9.0, (D) 50 mM sodium phosphate buffer, pH 9.0; Migration time, peak width, and peak areas of QD-605 streptavidin conjugate in different buffers were shown in (E), (F), and (G). 10 nM QD-605 streptavidin conjugate were injected with pressure injection at 50 mbar × 10 s, normal polarity, separation voltage 25 kV. Uncoated fused-silica capillary, I.D. 50 μm, effective length 45 cm.

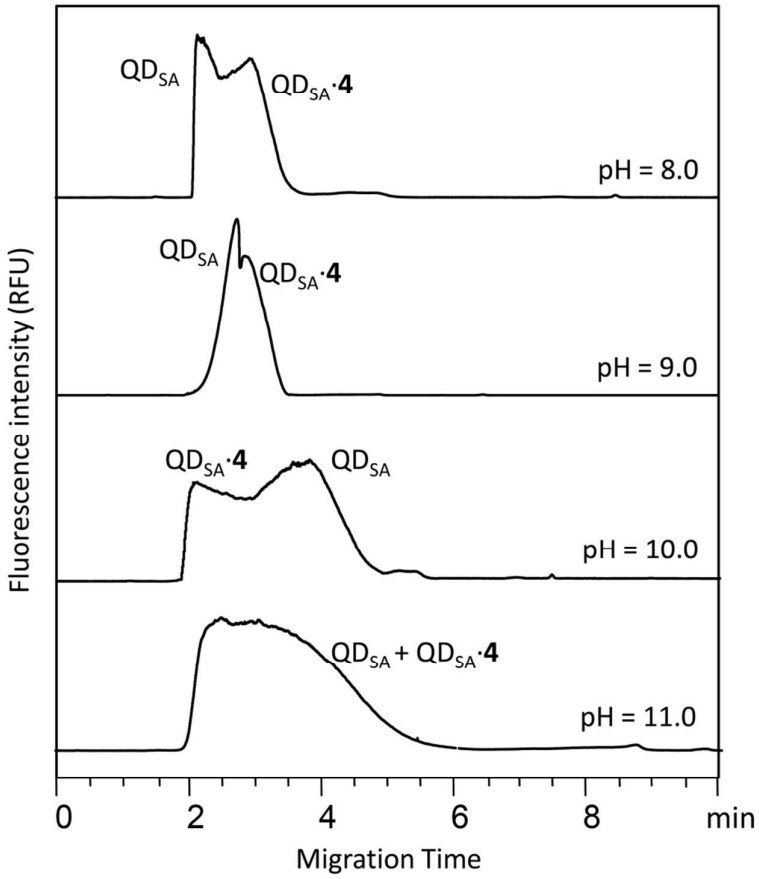


**Figure S3.** Analysis of QD–disaccharide conjugate and QDs by capillary electrophoresis with LIF detection. The temperature of the separation capillary column was thermostated at 25 °C, and a 45 cm effective separation length capillary (60 cm total) with 75 μm I.D. was used. The separation buffer is 50 mM sodium carbonate buffer (pH 8.0 – 11.0), and the applied voltage is 16 kV. Samples were injected into the capillary using pressure at 50 mbar for 10 s. QD-disaccharide conjugates are labeled as QD$_{SA}$·**4** and QD-streptiavidin as QD$_{SA}$.

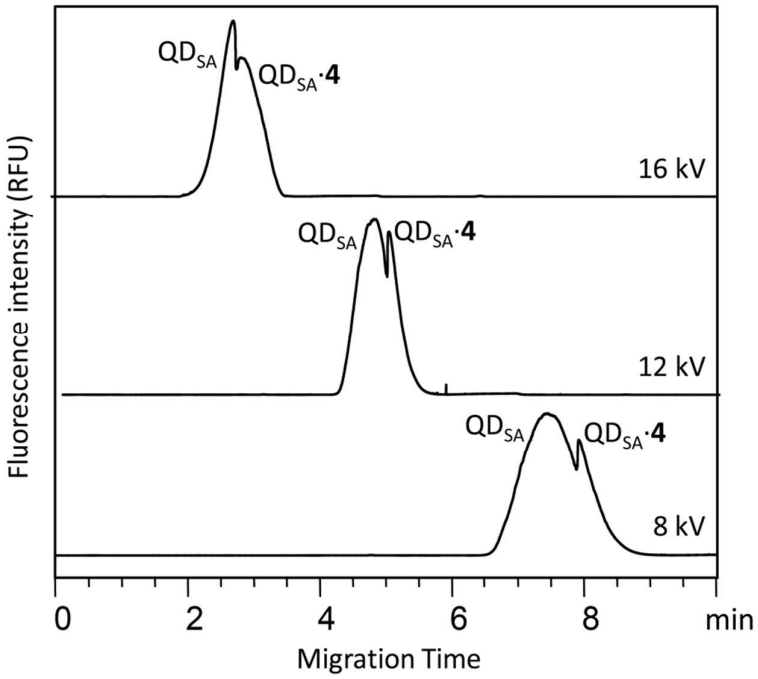


**Figure S4.** Electropherograms for the separation of a mixture of QD-disaccharide conjugate and unbound QDs under different separation voltages. The temperature of the separation capillary column was thermostated at 25 °C, and a 45 cm effective separation length capillary (60 cm total) with 75 μm I.D. was used. The separation buffer is 50 mM sodium carbonate buffer, pH 9.0, and the applied voltage is shown in the figure. Samples were injected into the capillary using pressure at 50 mbar for 10 s. QD-disaccharide conjugates are labeled as $QD_{SA}$**·4** and QD-streptiavidin as $QD_{SA}$.

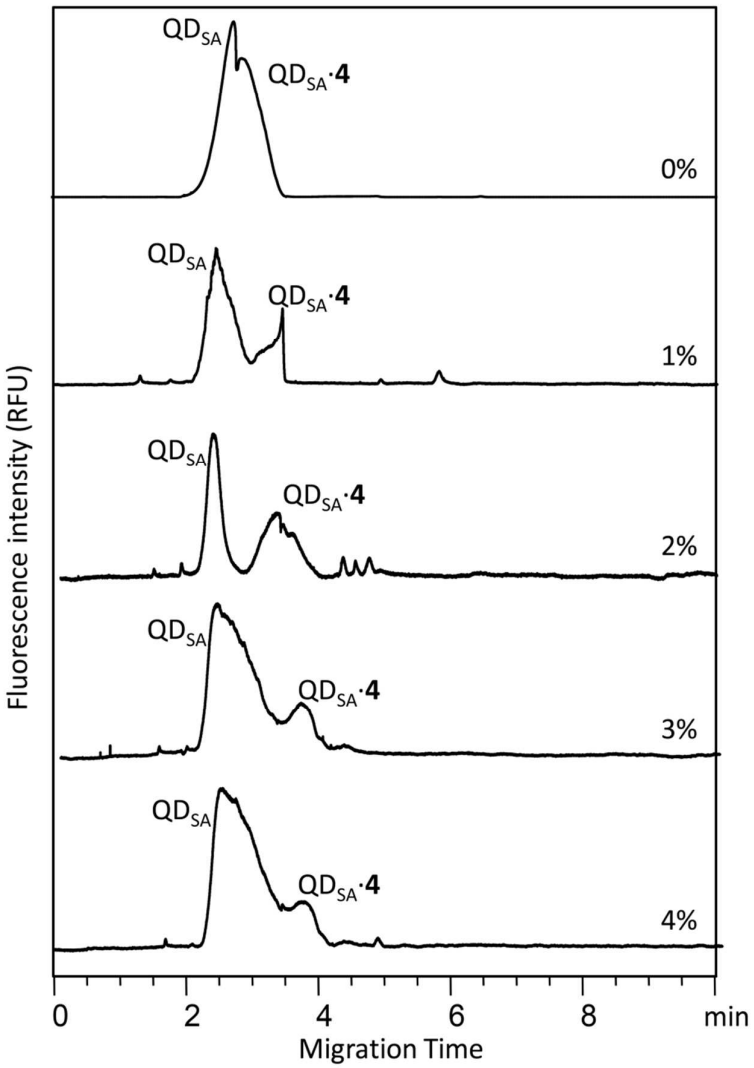


**Figure S5.** Electropherograms for the separation of a mixture of QD-disaccharide conjugate and unbound QDs using different concentrations of 0 - 4.0% PEG in the operating buffer. The temperature of the separation capillary column was thermostated at 25 °C, and a 45 cm effective separation length capillary (60 cm total) with 75 μm I.D. was used. The separation buffer is 50 mM sodium carbonate buffer, pH 9.0, and the applied voltage is 16 kV. Samples were injected into the capillary using pressure at 50 mbar for 10 s. QD-disaccharide conjugates are labeled as $QD_{SA}$·**4** and QD-streptiavidin as $QD_{SA}$.

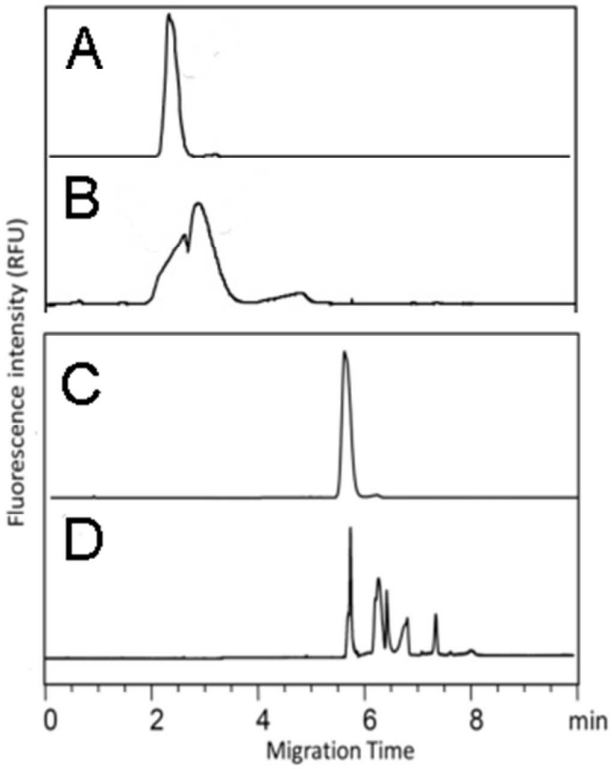


**Figure S6.** Electropherograms for the separation of a mixture of QD-disaccharide conjugate and unbound QDs on capillaries with different inner diameter. (A) QD-605 streptavidin conjugate only on a 75 μm I.D.capillary , (B) reaction mixture on a 75 μm I.D. capillary column; (C) QD-605 streptavidin conjugate only on a 25 μm I.D. capillary; (D) reaction mixture on a 25 μm I.D. capillary column.

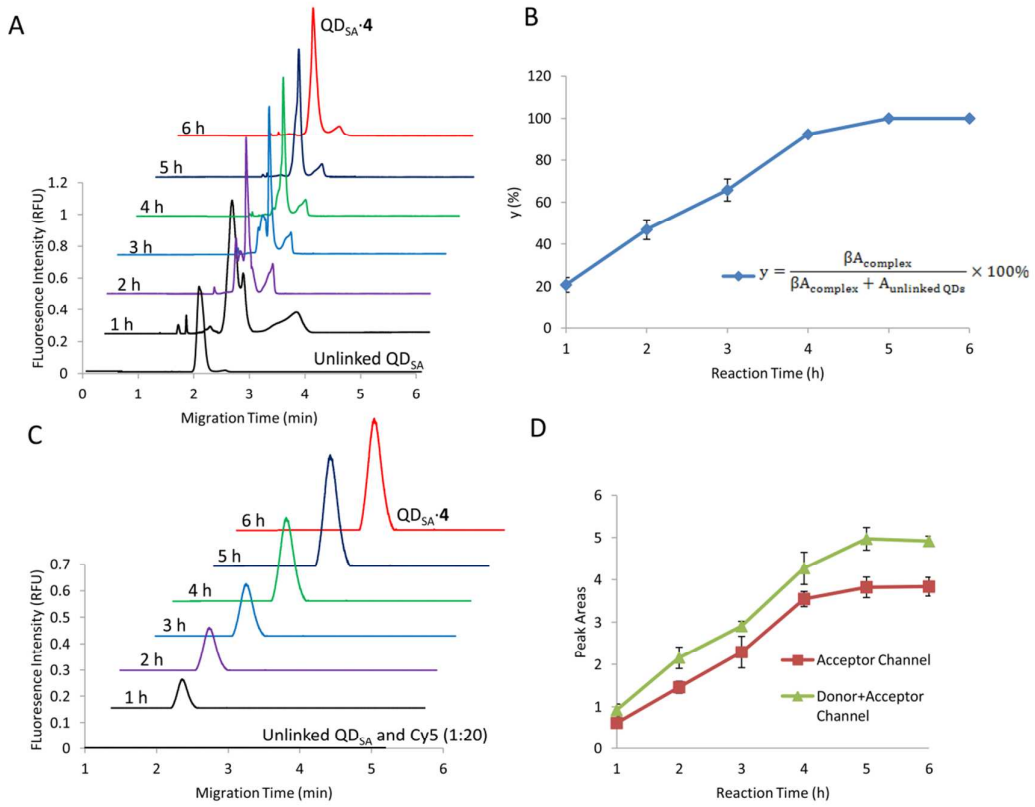


**Figure S7.** Electrophoretograms of conjugation of biotinylated and Cy5 labeled disaccharide **4** and QD-605 streptavidin conjugate $QD_{SA}$ monitored by CE-LIF from donor + acceptor channel (A), and acceptor channel (C). Ratio of biotinylated and Cy5 labeled disaccharide **4** to QD-605 streptavidin conjugate is 20:1, final concentration of QDs is 10 nM. (B) The percentage of **4**-$QD_{SA}$ FRET complex in the mixture plot versus reaction time, based on eq. 9, (D) peak areas of FRET complex from two channels. Reaction mixtures were injected with pressure injection at 50 mbar × 10 s, operating buffer was 50 mM carbonate buffer, pH 9.0, normal polarity, separation voltage 16 kV. Uncoated fused-silica capillary, I.D. 75 μm, effective length 45 cm.