

Supplementary Information

**Exploring Attachment Chemistry with FRET in Hybrid Quantum Dot
Dye-Labeled DNA Dendrimer Composites**

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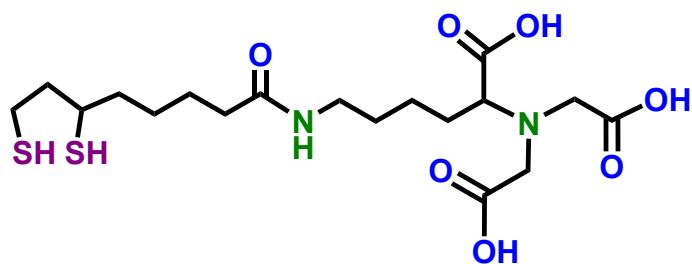


Figure S1. Structure of the DHLA-NTA ligand.

Table S1. Estimated donor quenching and E_{ae} in selected control configurations prepared using Strategy I - covalent EDC coupling chemistry.

Configuration	QD	Cy3	Cy3.5	Cy5	[E_{ae} %]
One missing dye	Donor loss %				
QD - X - Cy3.5 - Cy5 - Cy5.5	30		97	58	[3]
QD - Cy3 - X - Cy5 - Cy5.5	49	74		49	[9]
QD - Cy3 - Cy3.5 - X - Cy5.5	53	100	60		[16]
Two missing dyes					
QD - X - X - Cy5 - Cy5.5	18			83	[2]
QD - X - Cy3.5 - X - Cy5.5	24		83		[3]
QD - X - Cy3.5 - Cy5 - X	27		96		[18]
QD - Cy3 - X - X - Cy5.5	45	46			[13]
QD - Cy3 - X - Cy5 - X	39	56			[14]
QD - Cy3 - Cy3.5 - X - X	67	100			[53]

Notes. All values have standard deviations less than 5%, not shown for brevity. X indicates missing dye.
 E_{ae} is anywhere-to-end energy transfer efficiency.

Table S2. Estimated donor quenching and E_{ae} in selected control configurations prepared utilizing Strategy II - His₆-Zn coordination chemistry.

Configuration	QD	Cy3	Cy3.5	Cy5	[E_{ae} %]
One missing dye	Donor loss %				
QD - X - Cy3.5 - Cy5 - Cy5.5	37		98	83	[11]
QD - Cy3 - X - Cy5 - Cy5.5	53	87		84	[20]
QD - Cy3 - Cy3.5 - X - Cy5.5	75	91	77		[38]
Two missing dyes					
QD - X - X - Cy5 - Cy5.5	30			85	[8]
QD - X - Cy3.5 - X - Cy5.5	40		78		[18]
QD - X - Cy3.5 - Cy5 - X	50		94		[37]
QD - Cy3 - X - X - Cy5.5	58	73			[24]
QD - Cy3 - X - Cy5 - X	60	72			[46]
QD - Cy3 - Cy3.5 - X - X	67	92			[64]

Notes. All values have standard deviations less than 5%, not shown for brevity. X indicates missing dye.
 E_{ae} is anywhere-to-end energy transfer efficiency.

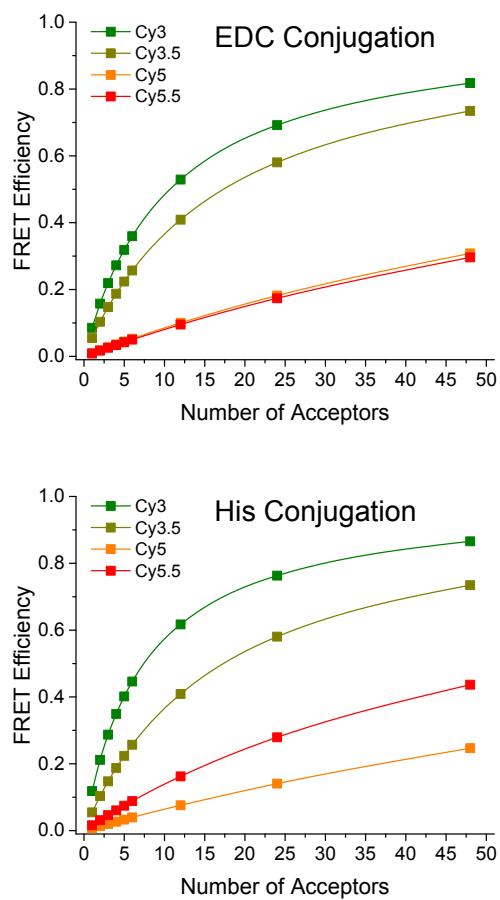


Figure S2. Expected FRET efficiency. FRET efficiency curves as a function of the number of dyes for the two conjugation strategies. The curves assume the r_{DA} and R_0 of each dye are unchanged upon additional dye incorporation.