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SUPPORTING INFORMATION

Pursuing Excitonic Energy Transfer with Programmable DNA-based Optical Breadboards

Divita Mathur[1,8], Sebastián A. Díaz[2,8], Niko Hildebrandt[4,5], Ryan D. Pensack[6], Bernard Yurke[6], Austin Biaggne[6], Lan Li[6,7], Joseph S. Melinger[3], Mario G. Ancona[3,8], William B. Knowlton[6]*, and Igor L. Medintz[2]*

[1]Department of Chemistry
Case Western Reserve University
Cleveland OH 44106 USA

[2]Center for Bio/Molecular Science and Engineering, Code 6900
[3]Electronics Science and Technology Division, Code 6800
U.S. Naval Research Laboratory
Washington, DC 20375 USA

[4]Department of Chemistry
Seoul National University
Seoul 08826, South Korea

[5]Laboratoire COBRA
Université de Rouen Normandie
CNRS, INSA, Normandie Université,
76000 Rouen, France

[6]Micron School of Materials Science & Engineering
Boise State University,
Boise, ID 83725 USA

[7]Center for Advanced Energy Studies
Idaho Falls, ID 83401, USA

[8]Department of Electrical and Computer Engineering
Florida State University
Tallahassee, FL 32310, USA

[8]Equal contributions

*Corresponding Authors: bknowlton@boisestate.edu
igor.medintz@nrl.navy.mil

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Supporting Table 1: Phosphoramidites available for in-synthesis modification of oligonucleotides. Reactive groups that are available as 3’ modification are usually present on the CPG whereas 5’, internal (int), and modified bases (dA, dC, dG, dT, dU) are available as phosphoramidites. *Commercially available. C_x - carbon linker of x length. TEG - triethylene glycol. Glen - Glen Research, Inc.

Reactive group/handle	Linkers	Purpose	Availability	Ref
Biotin*	C_6, TEG	Affinity for streptavidin	5' int 3' dT	1
Thiol*	C_3, C_6	Gold, maleimide	5' 3'	2
DBCO*	TEG	Azide click chemistry	5’ int dT	3
Phosphate*	None	Ligate another DNA	5' 3’	Glen
Amino*	C_6,C_{12}	Amide click chemistry	5' int dT	Glen
Alkyne*	C_8	Azide click chemistry	5’ int 3’	Glen
Maleimide*	C_2	Thiol click chemistry	5'	4
Methacrylate*	C_6	React with thiol, crosslink (expansion microscopy)	5'	5
Dendrimers*	C_2-C_4	DNA branching	5'	6
Aldehyde*	Backbone	Amine click chemistry	5'	7
Triazole	Ethynyl spacer	Reduce anionic charge, DNA and/or LNA ligation	Int	8-10
Cholesteryl*	TEG	Enhance cell permeability of DNA (10908328 ?)	5' int 3'	Glen
Ferrocene*	Nucleotide	Generate probes for electrochemical detection	dT	11, 12
Azobenzene*	D-threoninol	Photo-reactive modification	int	13
Triazine	Nucleotide	Reactive to 1-methylcyclopropenes	dU, dA	14
Cyclopropene	Nucleotide	Reactive to triazine	dU, dA	14
Ruthenium bipyridine	Nucleotide	Metallization, fluorescence	Int base	15-18

Terpyridine, Dipicolylamine* phenanthroline, dithioethers	Nucleotide	Metal coordination (Zn, Ni, Cu, Ag, Pb, etc) in DNA and LNA	5' int dG	19-23
Porphyrin	Backbone	Electron transfer, DNA aggregation	Int dC	24, 25
Galactose/carbohydrates	Nucleotide	Site-specific carbohydrate bioconjugation	Int dU	26, 27
Iodine/Bromine*	Nucleotide	Carbohydrate conjugation, photo cross-linking	dC dU	Glen
Dyes				
Cyanine (Cy3, Cy3.5, Cy5, Cy5.5)*	C_3/C_6	Attachment of Cy dye to DNA backbone via single or double phosphodiester bond	5’ int 3’	
Methylene Blue*	C_2/C_3	Attachment of MB to DNA via single or double phosphodiester bond	5’ Int 3’	
Black Hole, Blackberry™, and Dabcyl Quenchers*	C_2/C_6	Attachment to DNA via single phosphodiester terminal bond or via T nucleotide	5’ dT 3’	
Fluorescein*	C_6	Attachment to DNA via single/double phosphoramidite and T nucleotide	5’ Int dT 3’	
Rhodamine*	C_6	Attachment to DNA via dT or 3’ end single phosphodiester bond	dT 3’	
ATTO/Alexa Fluor™ dyes	C_6/C_{12}	Attachment to DNA via single phosphodiester bond	5’ 3’	

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