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Selective, Reversible Near-Infrared Fluorescence Quenching of Boronic Acid–Single-Walled Carbon Nanotube Complexes in Response to Glucose KYUNGSUK YUM, JIN-HO AHN, THOMAS MCNICHOLAS, PAUL BARONE, BIN MU, JONG-HO KIM, RISHABH JAIN, MICHAEL STRANO, Massachusetts Institute of Technology — We present the high throughput screening of a library of 30 boronic acid derivatives to form complexes with sodium cholate suspended single-walled carbon nanotubes (SWNTs) to screen for their ability to reversibly report glucose binding via a change in SWNT fluorescence. The screening identifies 4-cyanophenylboronic acid which uniquely causes a reversible wavelength red-shift in SWNT emission. The results also identify 4-chlorophenylboronic acid which demonstrates a turn-on fluorescence response when complexed with SWNTs upon glucose binding in the physiological range of glucose concentration (0 to 30 mM). The mechanism of fluorescence modulation in both of these cases is revealed to be a photo-induced excited-state electron transfer that can be disrupted by boronate ion formation upon glucose binding. This "turn-on" sensing scheme that uses the reversible fluorescence quenching and wavelength shift of the BA–SWNT complex offers a new approach for nIR optical sensing of glucose.

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