Supplementary Information:

1. Schematic diagram

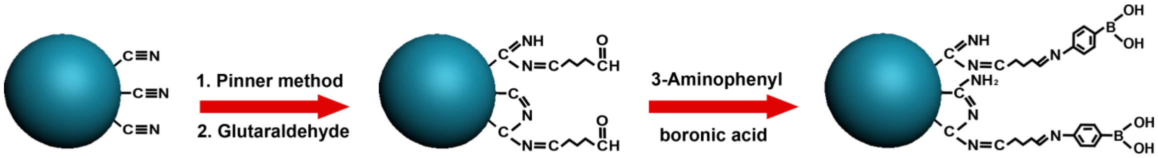


Fig. S1 Schematic diagram of the fabrication of B-PAN nanoparticles as fluorescent monosaccharide sensors.

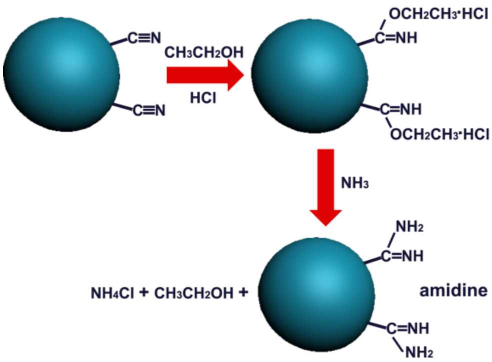


Fig. S2. Schematic diagram of Pinner synthesis on PAN nanoparticles.

In the first step, an intermediate imido ester is formed by reaction of the nitrile with alcohol and hydrogen chloride. In the second step, the amidine product is produced when the hydrochloride of the imido ester reacts with ammonia in an alcoholic solvent.

2. XPS analyses

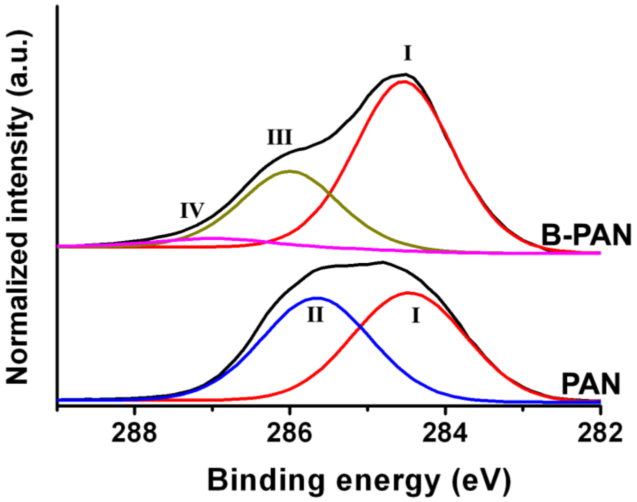


Fig. S3 Enlarged C 1s spectra of PAN and B-PAN nanoparticles.

The C 1s spectrum of PAN nanoparticles reveals two major components corresponding to the $–CH_2–$ and –CH= (peak I; 284.5 eV, 40.98%); –CN (peak II; 285.6 eV, 37.9%) (*Plasma Chem Plasma Process* **2006**, *26*, 119–126). In the case of B-PAN, two new peaks arise at 286.3 eV and 287.4 eV, which are assigned to the C1s of C=N (peak III) and C=O (peak IV), respectively (*Carbon* **2007**, *45*, 2433–2444).

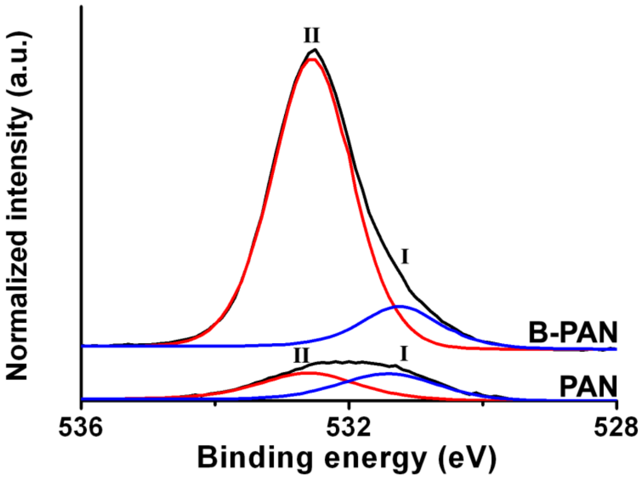


Fig. S4 Enlarged O 1s spectra of PAN and B-PAN nanoparticles.

In the case of PAN, the O1s region is separated by symmetric peaks at 531.3 eV (peak I) corresponding to O=C, and at 532.6 eV (peak II; -OH) (*Dalton Trans.*, 2010, **39**, 7330–7337). In the case of B-PAN, the peak II increases considerably due to boronic acid.

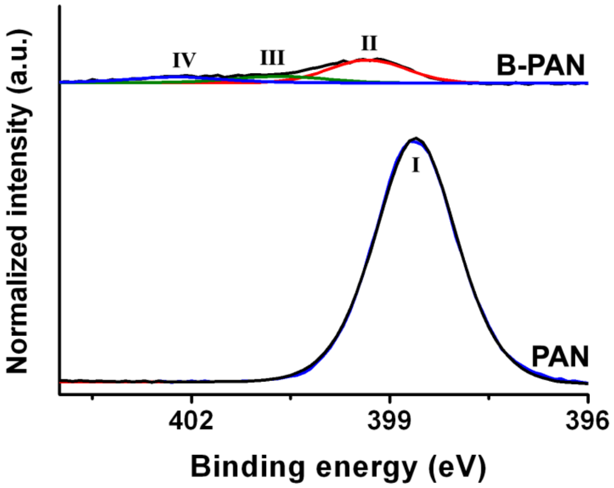


Fig. S5 Enlarged N 1s spectra of PAN and B-PAN nanoparticles.

The binding energy at 398.5 eV of PAN nanoparticles (peak I) is attributed to the N in the C≡N group (*Langmuir* **2008,** *24,* 10961-10967). In the case of B-PAN, the binding energies at 399.5 eV (peak II), 401.2 eV (peak III), and 401.9 eV (peak IV) can be assigned to the N in the –NH–, C=N, oxidized state of the nitrogen groups (*Langmuir* **2008,** *24,* 10961-10967; *Chem. Mater.* **2008,** *20,* 4425–4432).

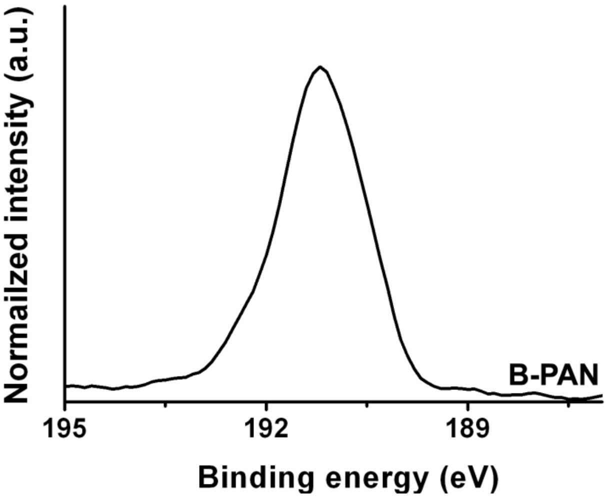


Fig. S6 Enlarged B 1s spectrum of PAN and B-PAN nanoparticles.

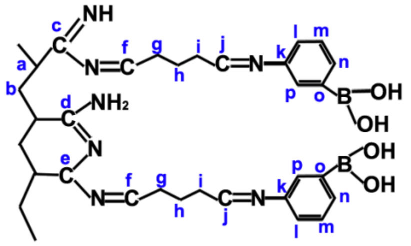
The B1s spectrum exhibited a peak at 190.2 eV, corresponding to the C-B bond. These results indicated that the boronic acid was successfully bound on the nanoparticles (*Electroanalysis* **2011**, *23*, 2036).

3. NMR analysis

TABLE S1. Resonance assignment of 13C CPMAS solid NMR spectrum of B-PAN nanoparticles

Resonance number	Chemical shift (ppm)	Assignments[a]
1	31.9	Aliphatic chain: a, b, h; phenyl boronic acid
2	42.9	Schiff base: e
3	54.8	g,i
4	61.5	g,i
5	73.4	Schiff base: c, d
6	78.6	Schiff base: c, d
7	82.0	Schiff base: c, d
8	91.1	Imine: f, j
9	101.6	Phenylboronic acid
10	124.0	Phenylboronic acid: k, l,
11	129.7	Phenylboronic acid: m, n, p
12	149.3	Phenylboronic acid: o
13	166.4	Imine: f, j
14	194.6	Schiff base: c, d

[a] Expected formula of B-PAN nanoparticles:



4. pH dependent fluorescence curve

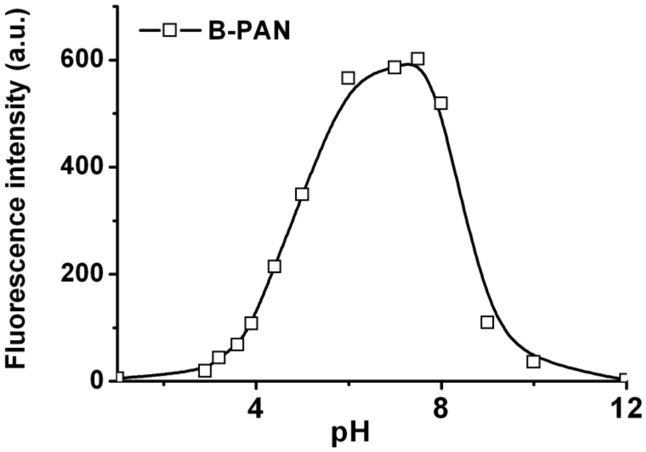


Fig. S7 Fluorescence intensity-pH profile of B-PAN nanoparticles; 10 μg mL^{-1} of B-PAN nanoparticles in 0.05 M NaCl buffer (52% methanol in water); λ_{ex} = 300 nm, λ_{em} = 376 nm.

The fluorescence-pH profiles of the B-PAN nanoparticles in the aqueous solution were determined since this allows a rapid preview of the optimal pH region of the nanoparticles. The appropriate pH value, approximately pH 7.4, will result in large fluorescence changes.