Electronic Supplementary Material (ESI) for Analytical Methods.
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Electronic supplementary information (ESI)

In situ formation of carbon dots aids ampicillin sensing

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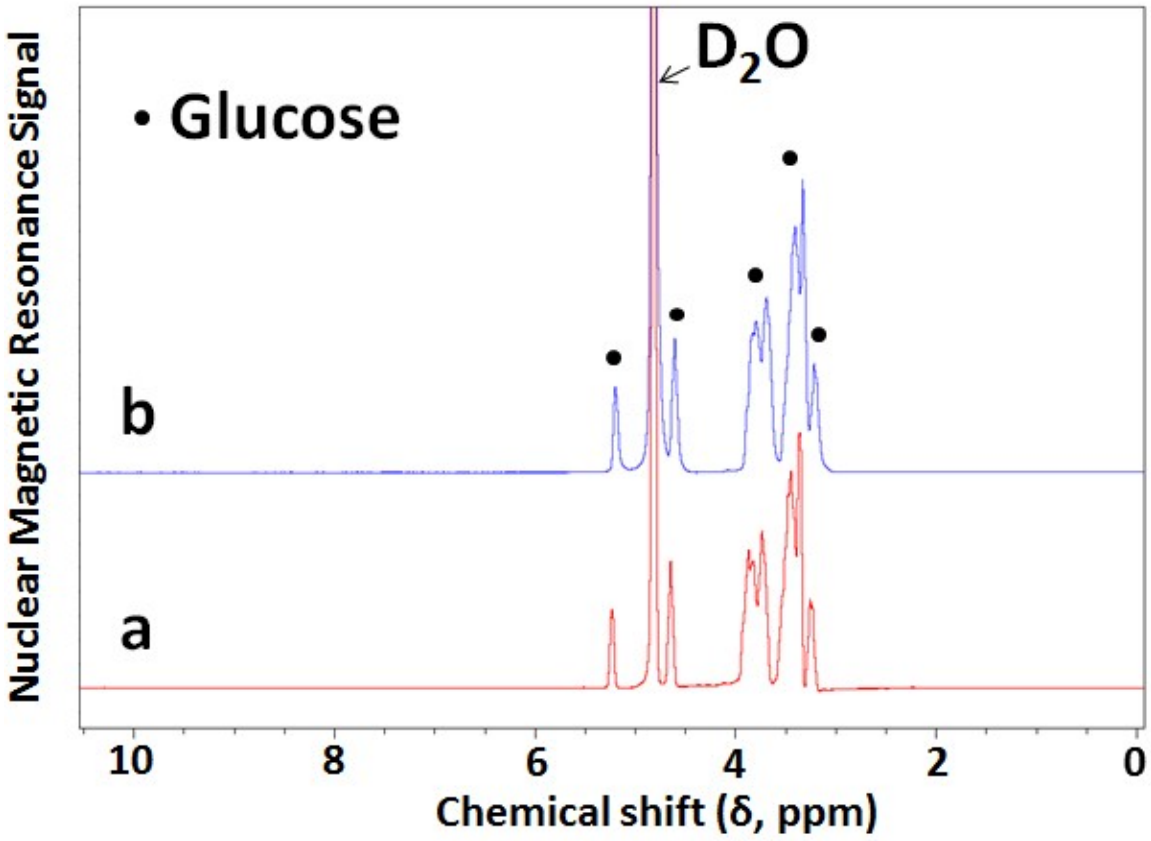


Fig. S1. ^{1}H NMR spectra of (a) glucose (5 wt.%) before, (b) glucose (5 wt.%) after the hydrothermal reaction at 120 °C for 40 min.

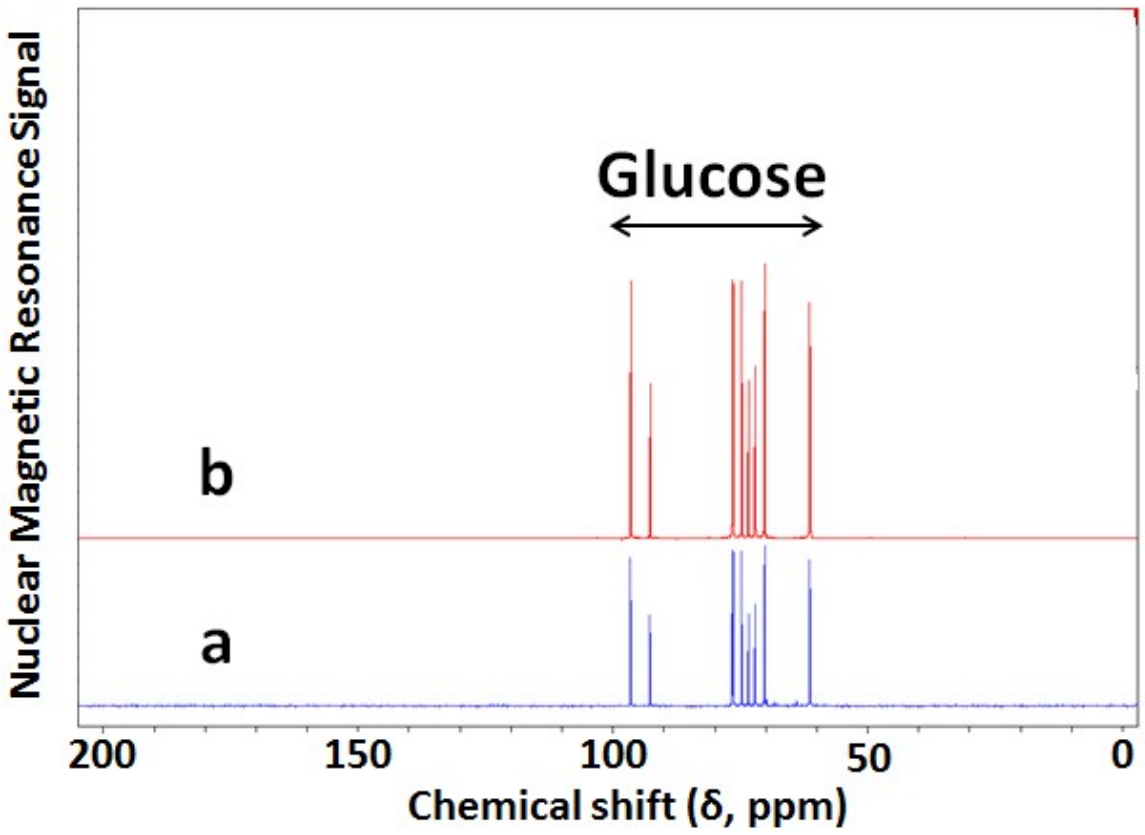


Fig. S2. ^{13}C NMR spectra of (a) glucose (5 wt.%) before, (b) glucose (5 wt.%) after the hydrothermal reaction at 120 °C for 40 min.

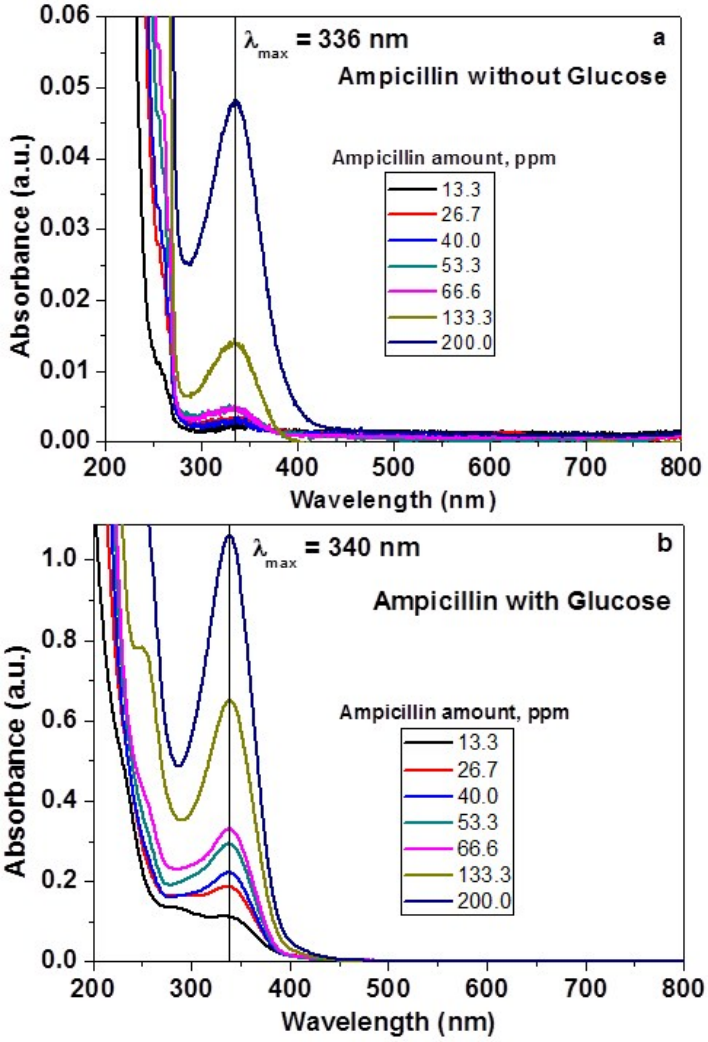


Fig. S3. Role of glucose in ampicillin sensing: UV-Vis absorption spectra of (a) aqueous solution of ampicillin (13-200 ppm) alone and (b) aqueous solutions of ampicilling (13-200) with glucose (5 wt.%) subjected to hydrothermal treatment at 120 °C for 40 min.

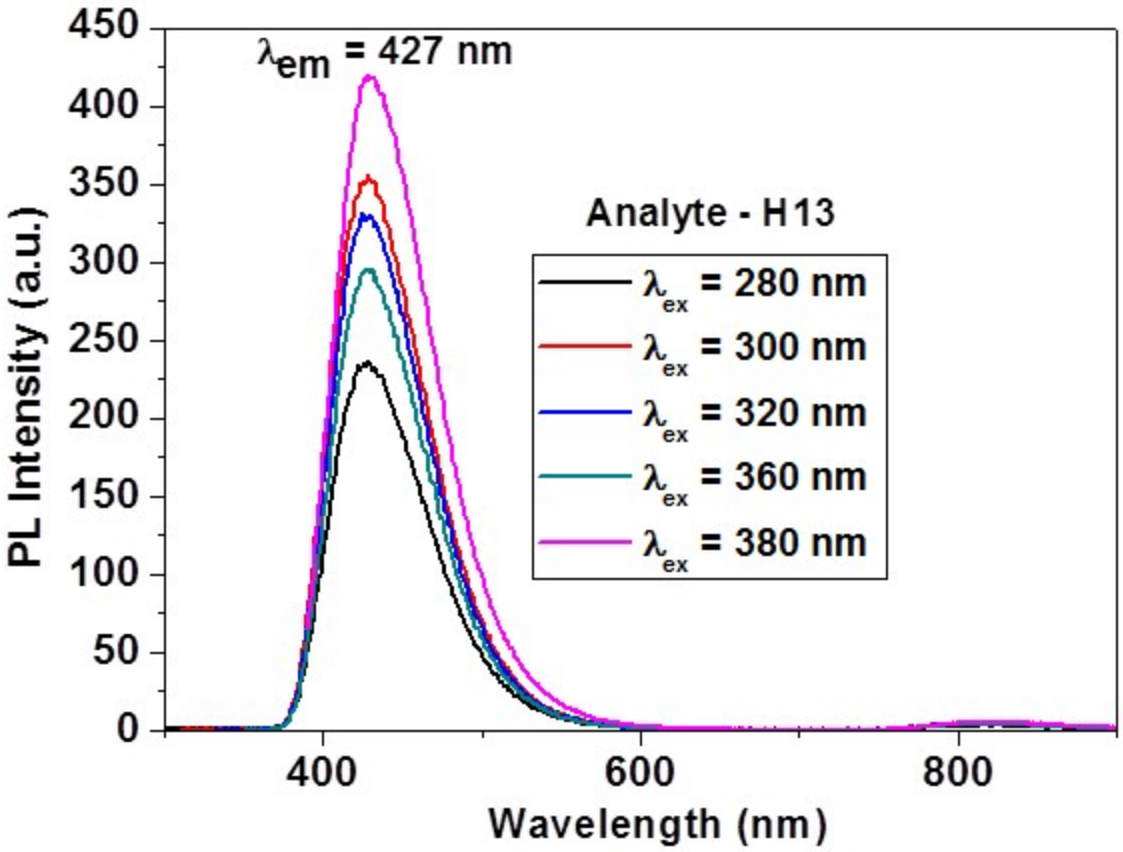


Fig. S4. Photoluminescence (PL) spectra of analyte H13 (ampicillin, 533 ppm) after hydrothermal treatment (120 °C, 40 min.) excited at different wavelengths. (Typical composition of H13 could be found in Table S1)

Table S1. Analytes with varying amounts of ampicillin (0 - 533 ppm)

Sample code	H0	H1	H2	H3	H4	H5	H6	H7	H8	H9	H10	H11	H12	**H13**
Glucose (5 %), mL	1	1	1	1	1	1	1	1	1	1	1	1	1	**1**
Ampicillin (0.1 %), mL	0	0.1	0.2	0.4	0.6	0.8	1.0	2.0	3.0	4.0	5.0	6.0	7.0	**8.0**
Ampicillin (in ppm)	0	6.6	13.3	26.7	40	53.3	66.6	133.3	200	266.6	333.3	400	466.6	**533**
Water, mL	14.0	13.9	13.8	13.6	13.4	13.2	13.0	12.0	11.0	10.0	9.0	8.0	7.0	**6.0**
Total volume, mL	15	15	15	15	15	15	15	15	15	15	15	15	15	**15**

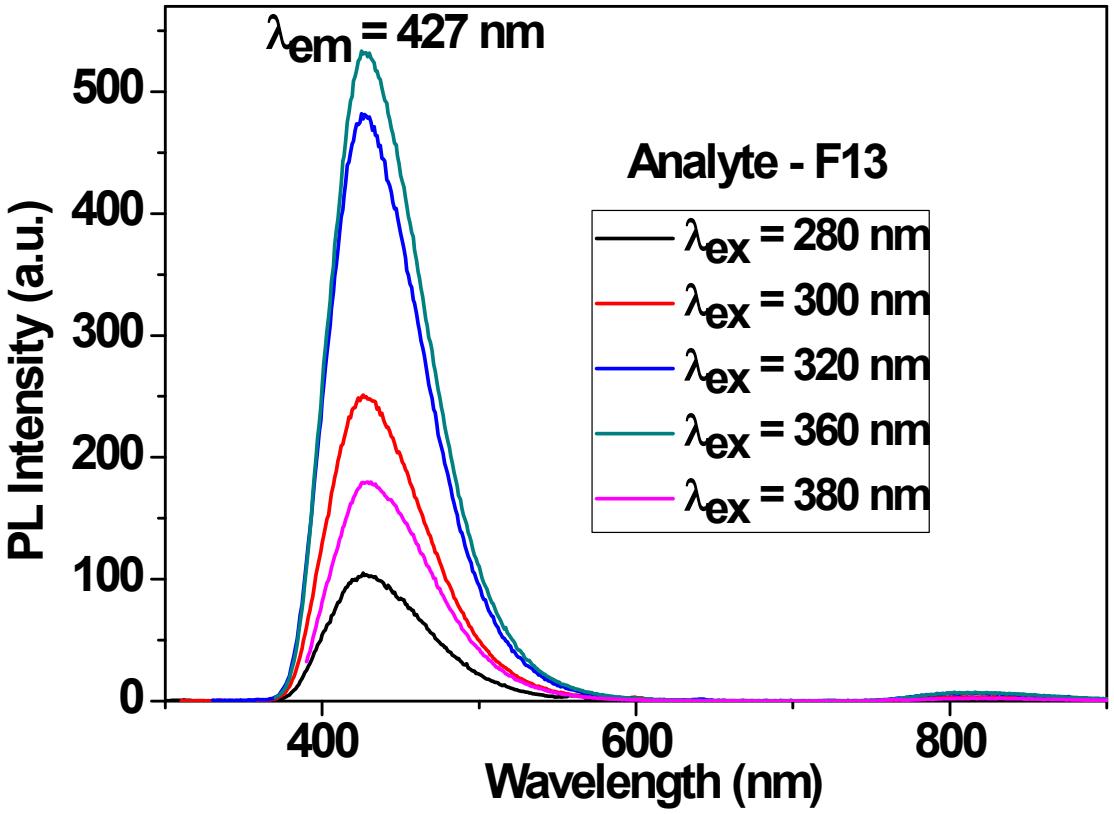
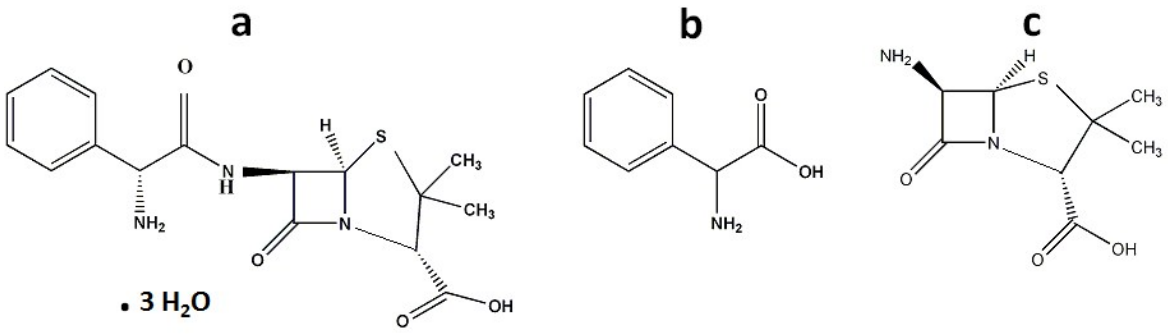


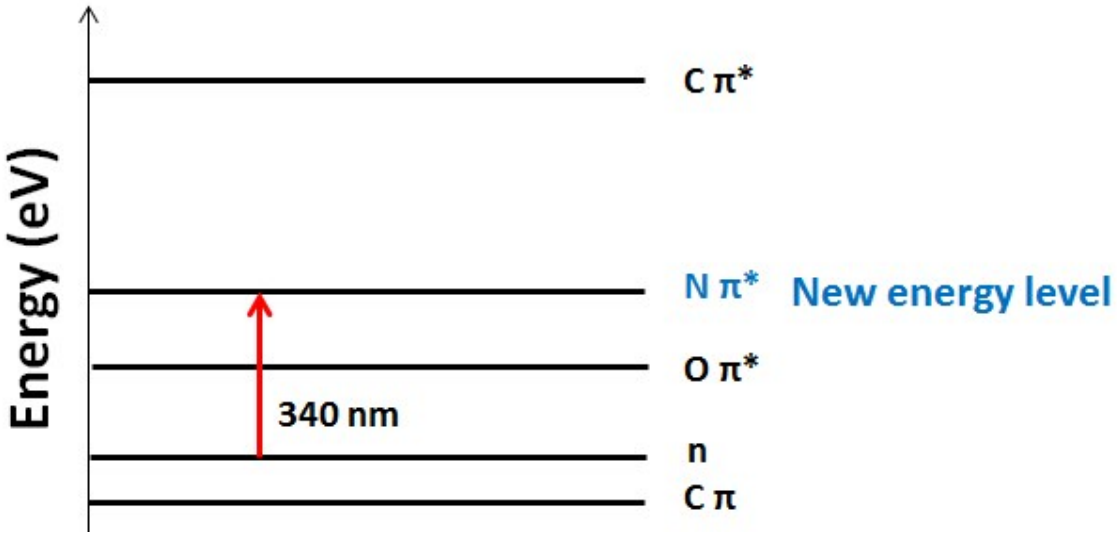
Fig. S5. Photoluminescence (PL) spectra of analyte F13 (ampicillin, 93.3 ppm) after hydrothermal treatment (120 °C, 40 min.) excited at different wavelengths. (Typical composition of F13 could be found in Table S2)

Table S2. Analytes with varying amounts of ampicillin (0 - 93.3 ppm)

Sample code	F0	F1	F2	F3	F4	F5	F6	F7	F8	F9	F10	F11	F12	F13
Glucose (1 %), mL	1	1	1	1	1	1	1	1	1	1	1	1	1	1
Ampicillin (0.01 %), mL	0	0.1	0.2	0.4	0.6	0.8	1.0	2.0	4.0	6.0	8.0	10.0	12.0	14.0
Ampicillin (in ppm)	0	0.6	1.3	2.6	4	5.3	6.6	13.3	26.7	40	53.3	66.6	80.0	93.3
Water, mL	14.0	13.9	13.8	13.6	13.4	13.2	13.0	12.0	10.0	8.0	6.0	4.0	2.0	0
Total volume, mL	15	15	15	15	15	15	15	15	15	15	15	15	15	15



Scheme S1. Chemical structures of (a) ampicillin, (b) 2-phenyl glycine, and (c) (+)-6-amino penicillanic acid



Scheme S2. Formation of new energy level (Nπ*) in the carbon dot structure by the incorporation of nitrogen

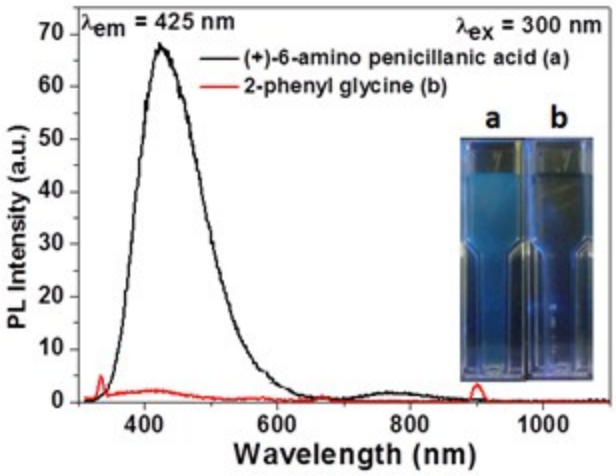


Fig. S6. Photoluminescence spectra of (a) (+)-6-amino penicillanic acid and (b) 2-phenyl glycine (Inset: Photographs of aqueous solution of carbon dots from (a) (+)-6-amino penicillanic acid and (b) 2-phenyl glycine, under UV lamp, 365 nm)

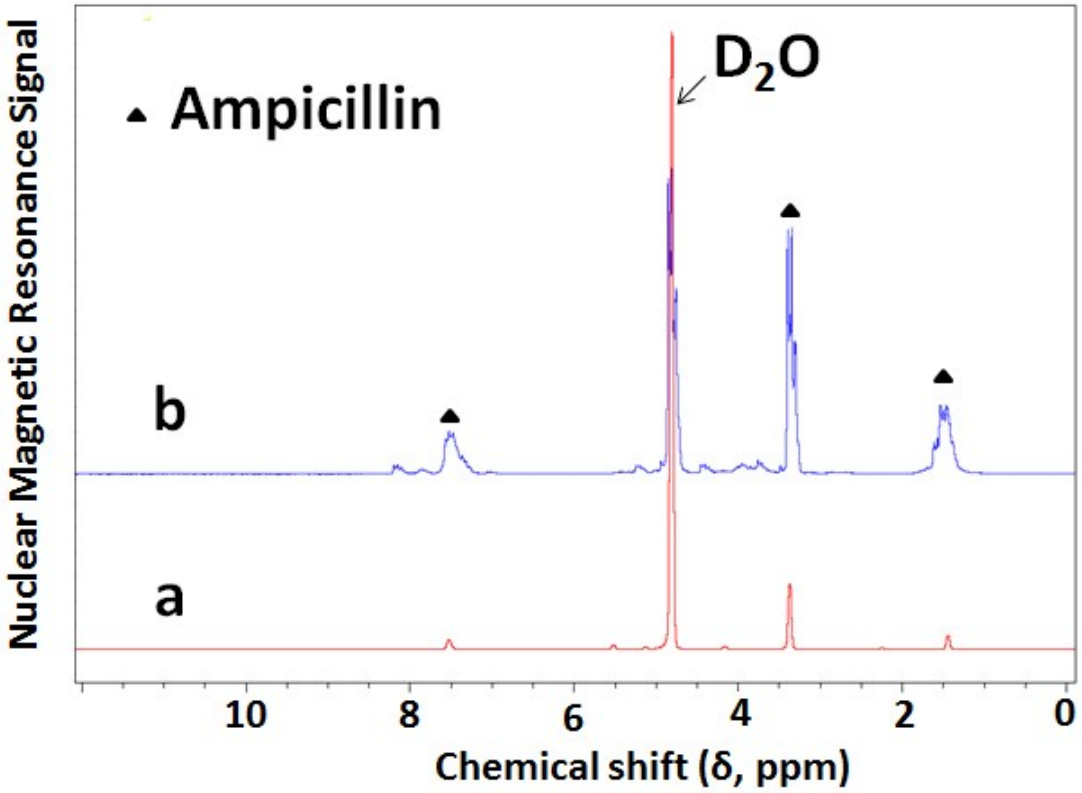


Fig. S7. ^{1}H NMR spectra of ampicillin (0.1 wt.%) (a) before, and (b) after the hydrothermal reaction at 120 °C for 40 min.

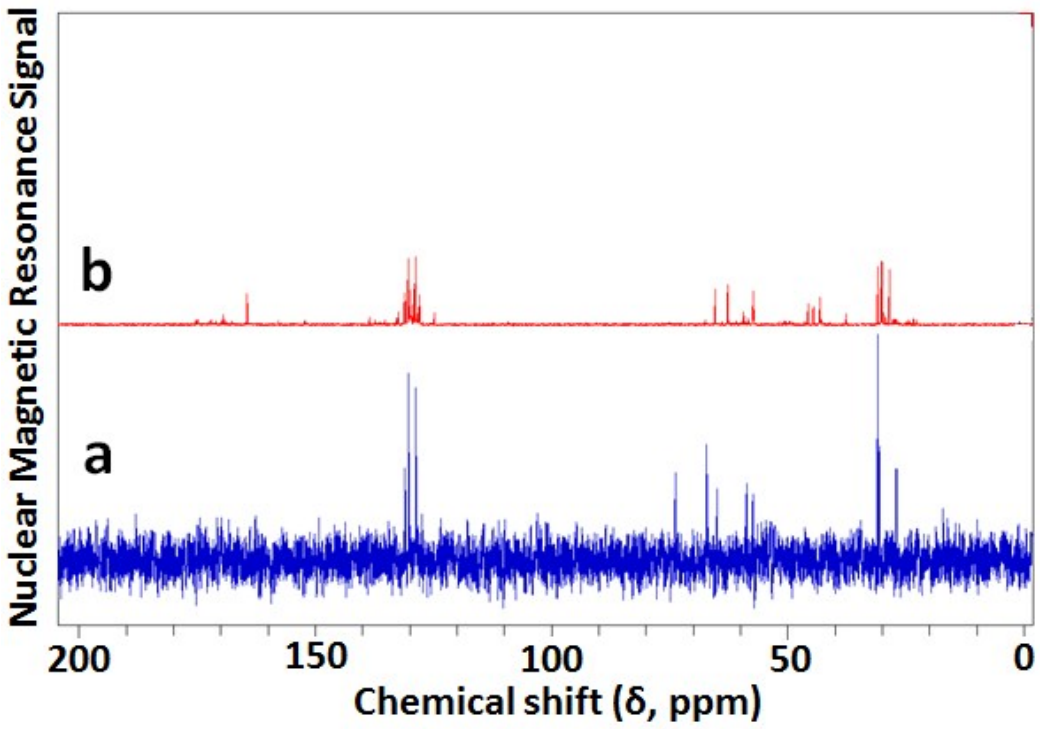


Fig. S8. ^{13}C NMR spectra of (a) ampicillin (0.1 wt.%) before, and (b) after the hydrothermal reaction at 120 °C for 40 min.

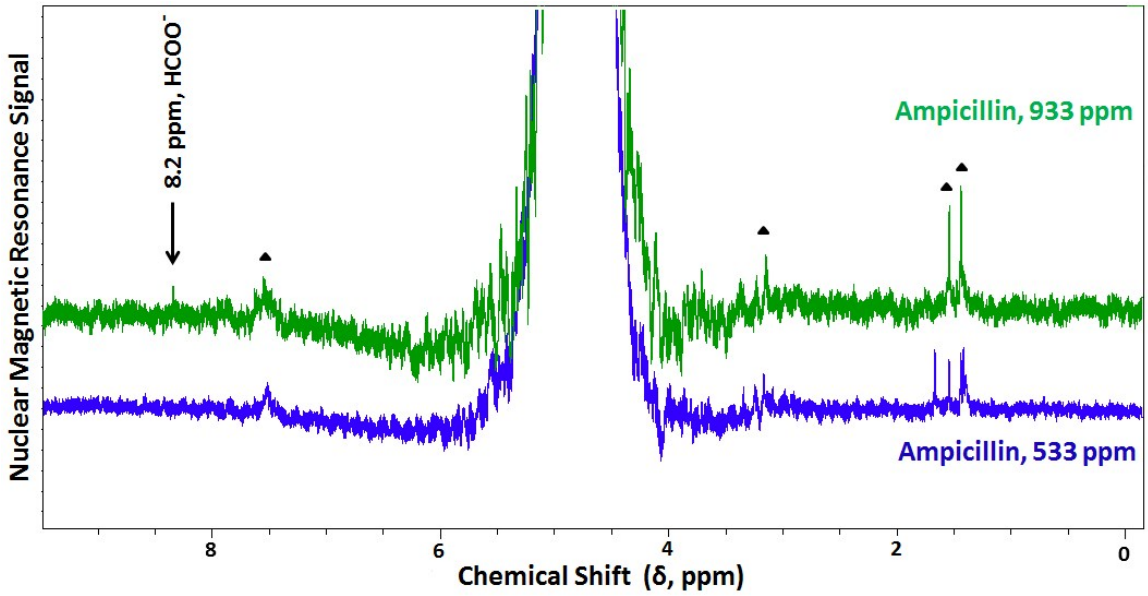


Fig. S9. ^{1}H NMR spectra of the aqueous solution of ampicillin of different concentrations (533 and 933 ppm) after subjected to hydrothermal treatment at 120 °C for 40 min.

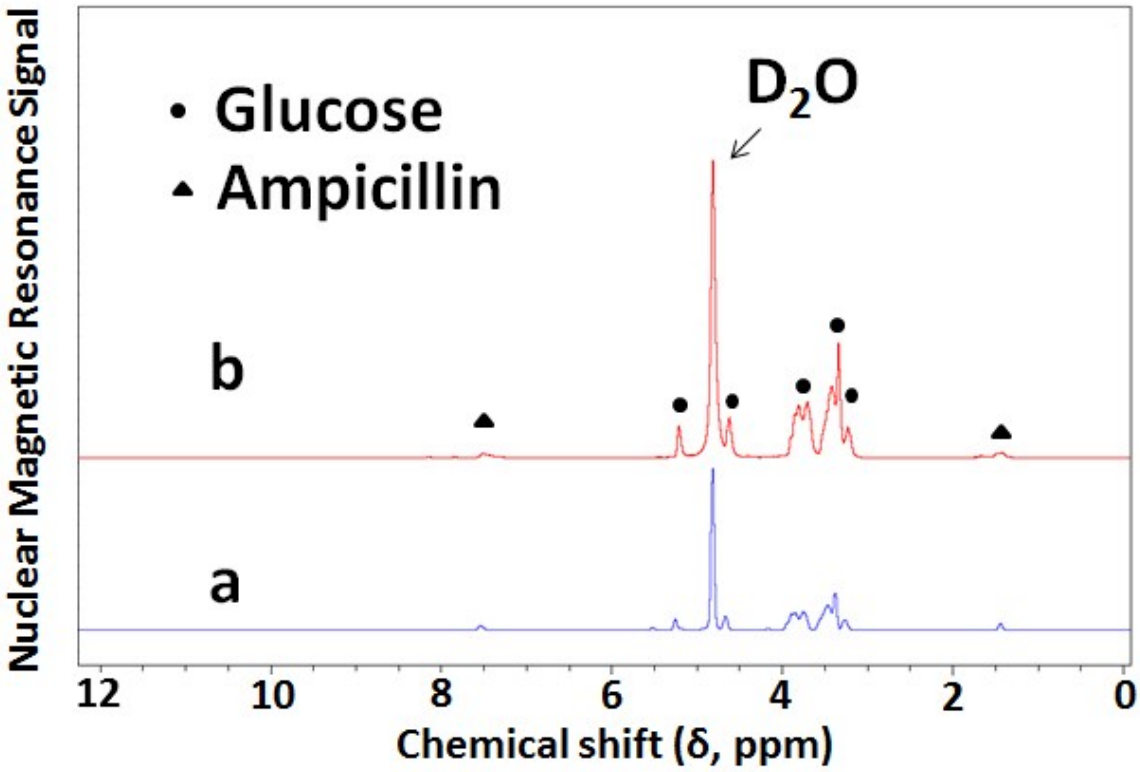


Fig. S10. ^{1}H NMR spectra of glucose (5 wt.%) - ampicillin (0.1 wt.%) solution (a) before and (b) after the hydrothermal reaction at 120 °C for 40 min.

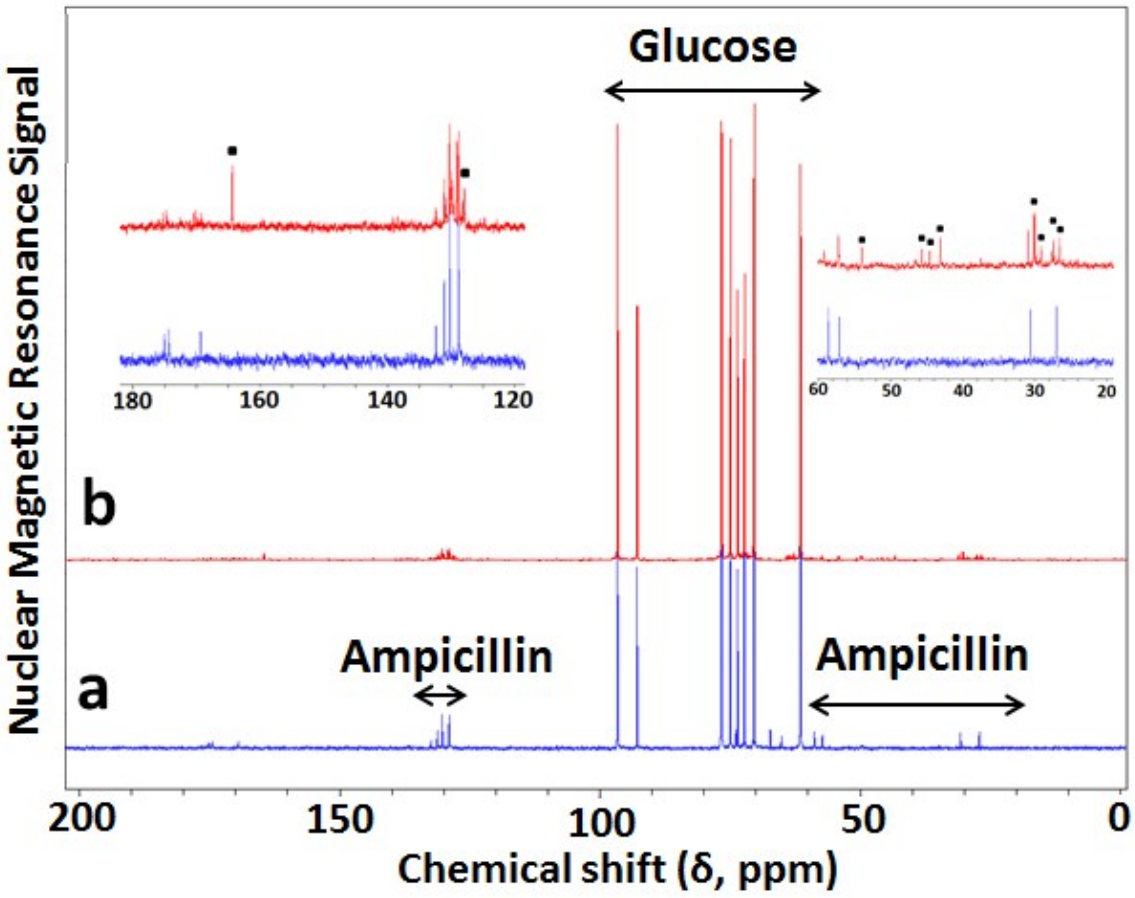


Fig. S11. ^{13}C NMR spectra of glucose (5 wt.%) - ampicillin (0.1 wt.%) solution (a) before and (b) after the hydrothermal reaction at 120 °C for 40 min.

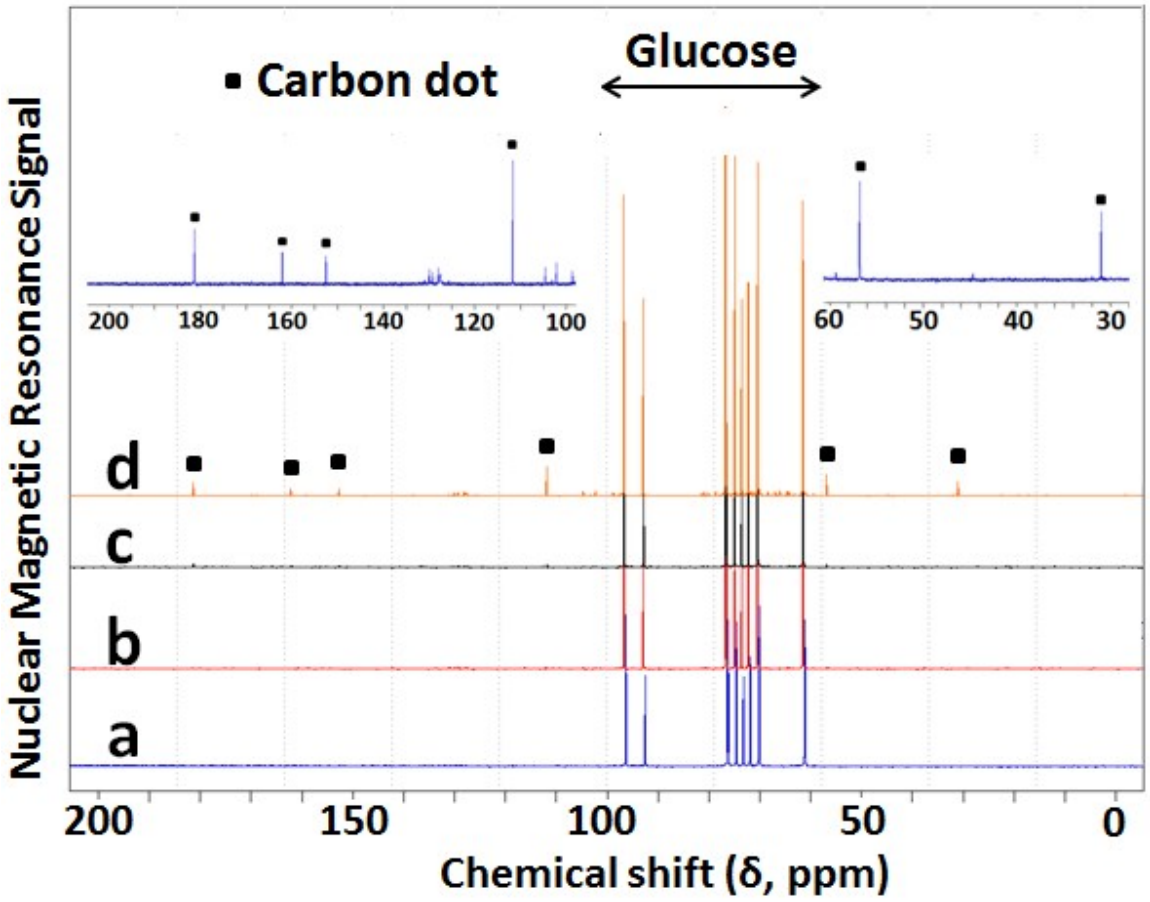


Fig. S12. ^{13}C NMR spectra of analytes from glucose (5 wt. %) and ampicillin (0.1 wt. %) solution subjected to hydrothermal treatment at 150 °C for (a) 2 h, (b) 4 h, (c) 6 h and (d) 12 h

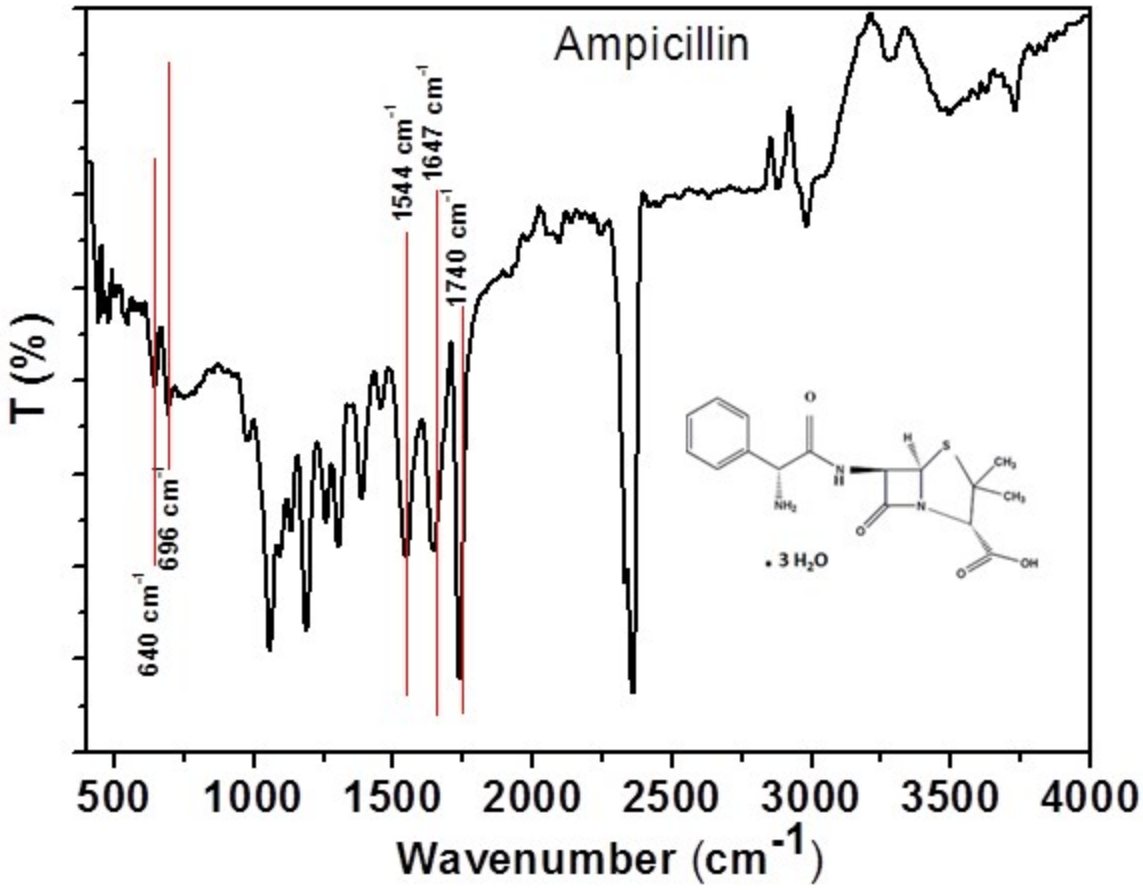


Fig. S13. FT-IR spectrum of ampicillin

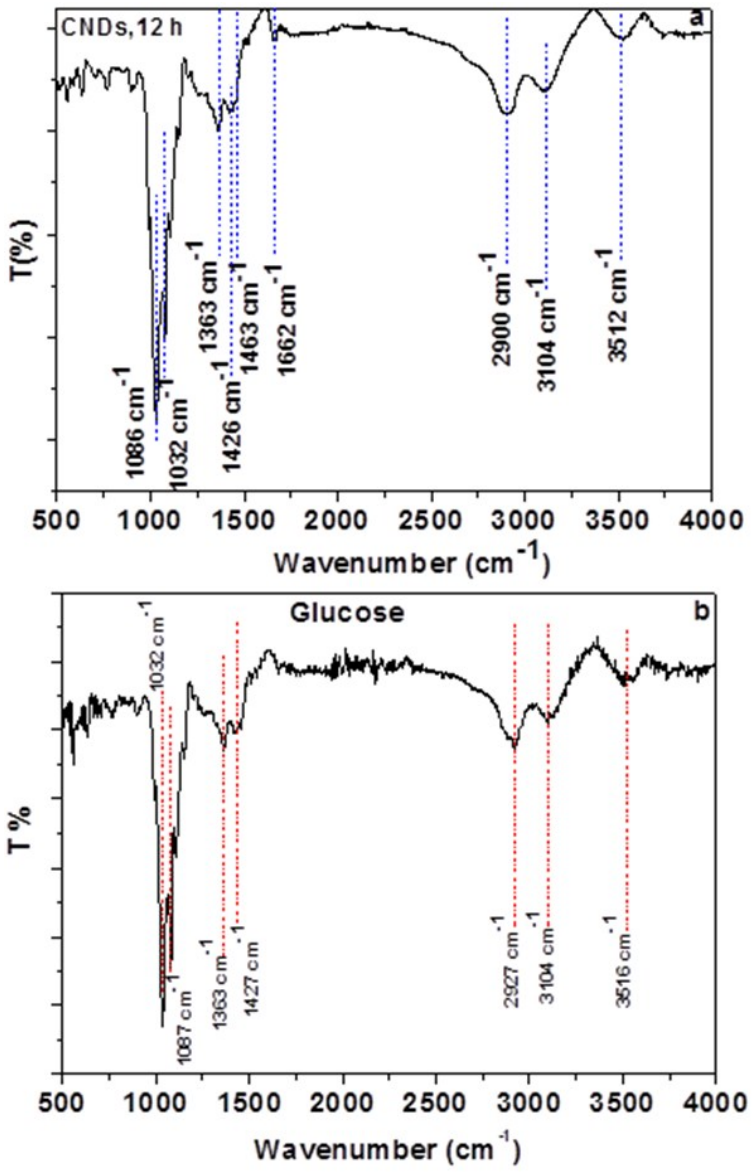


Fig. S14. FT-IR spectra of (a) Carbon nanodot (CNDs)-glucose composite obtained after 12 h of hydrothermal reaction at 150 °C and (b) aq. glucose (5 wt.%)

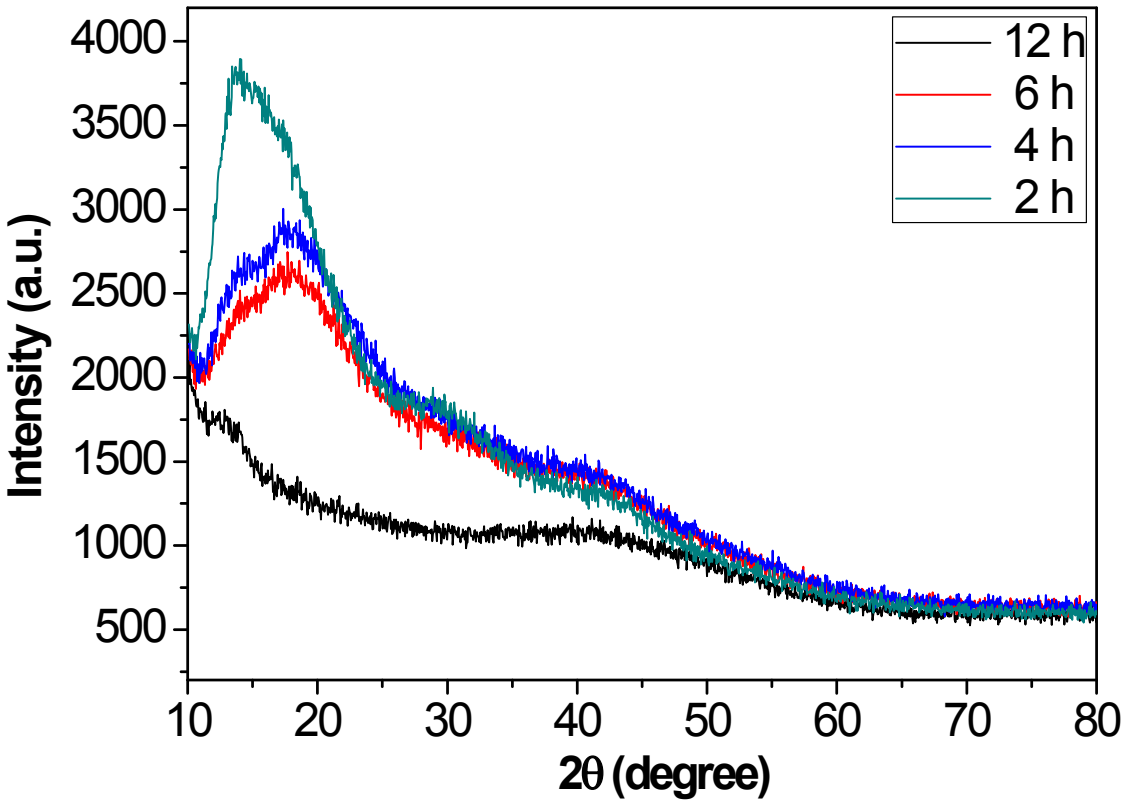


Fig S15. XRD pattern of carbon dots generated in the hydrothermal reaction at 150 °C for 2, 4, 6 and 12 h