

Supporting Information:

Synthesis of Polyaniline (PANI)

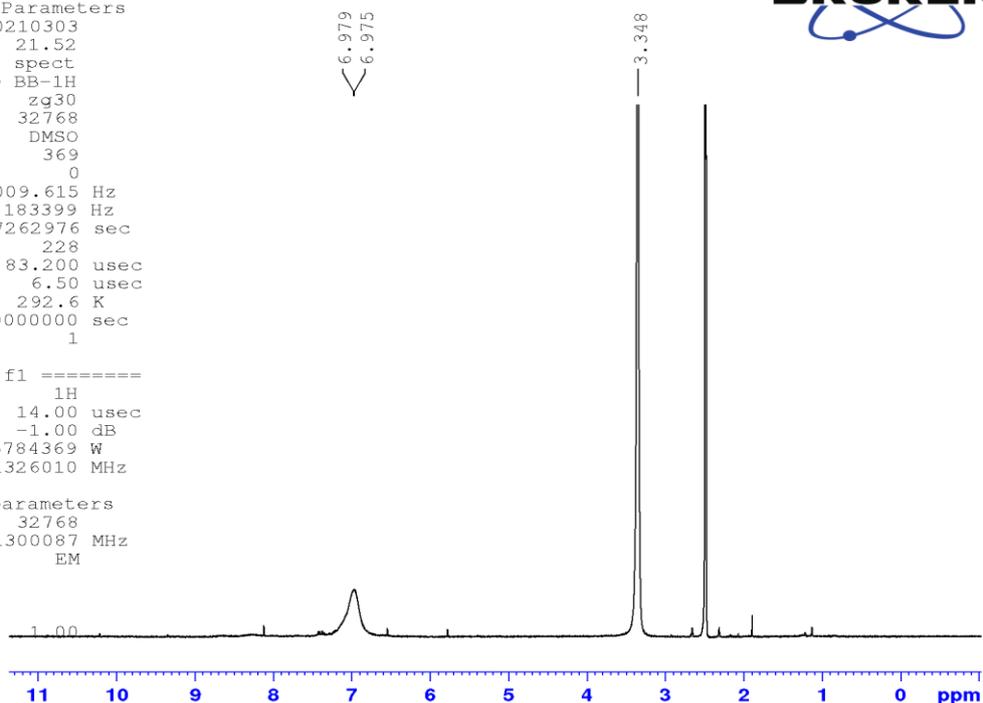
PANI was typically synthesized by oxidative chemical polymerization using equimolar quantity of aniline and ammonium persulphate (APS) in 1.0 M HCl aqueous solution. The reaction was performed in an ice bath with drop-wise addition of APS into aniline monomer solution. And then, it was stirred for 4 hours followed by vacuum filtration. The PANI-emeraldine salt thus obtained washed with 1.0 M HCl and distilled water. Subsequently, PANI was de-doped with 1.0 M ammonium hydroxide solution for further 12 hours under magnetic stirring to produce emeraldine base (EB) form of PANI. Afterwards, the EB form of PANI was filtered, washed with DI water and dried under vacuum for 24 hours. The typical yield of obtained EB form of PANI was calculated at ~ 35%.

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Current Data Parameters
NAME      20210302-PANI-0.01g ok
EXPNO     1
PROCNO    1
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F2 - Acquisition Parameters
Date_     20210303
Time      21.52
INSTRUM   spect
PROBHD    5 mm BBO BB-1H
PULPROG   zg30
TD        32768
SOLVENT   DMSO
NS        369
DS        0
SWH       6009.615 Hz
FIDRES    0.183399 Hz
AQ        2.7262976 sec
RG        228
DW        83.200 usec
DE        6.50 usec
TE        292.6 K
D1        1.50000000 sec
TD0       1
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===== CHANNEL f1 =====
NUC1      1H
P1        14.00 usec
PL1       -1.00 dB
PL1W      7.55784369 W
SFO1      400.1326010 MHz
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F2 - Processing parameters
SI        32768
SF        400.1300087 MHz
WDW       EM
SSB       0
LB        0 Hz
GB        0
PC
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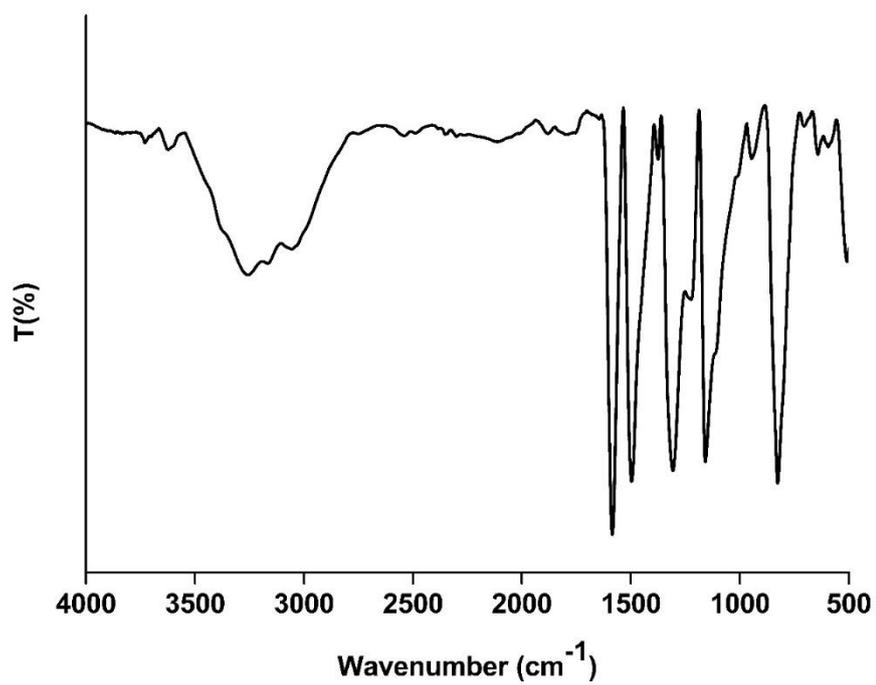


Fig. S1 The representative spectrum of (a) ¹H-NMR and (b) FTIR of PANI

Table S1. Quick response(s) and recovery time data of PANI (a) PANI-CA-1 (b) PANI-CA-3 (c) sensor as normalized current (I/I_0) to the concentration ranging from 1 to 50 ppm flowed through the measuring chamber (1000 sccm, $V = +0.1$ V) at 60% RH.

Response time (s):

<i>Material Name</i>	<i>1 ppm</i>	<i>5 ppm</i>	<i>10 ppm</i>	<i>20 ppm</i>	<i>30 ppm</i>	<i>40 ppm</i>	<i>50 ppm</i>
PANI	108	50	30	15	9	5	1
PANI-CA-1	1	1	1	1	1	1	1
PANI-CA-3	1	1	1	1	1	1	1

Recovery time (min):

Material Name	1 ppm	5 ppm	10 ppm	20 ppm	30 ppm	40 ppm	50 ppm
PANI	5.25	11	12.5	13.25	14.75	15.25	16.25
PANI-CA-1	2.25	7.75	10.25	12.25	13.75	15.25	17.75
PANI-CA-3	8.5	10	13	13.75	15	15.25	16.75

Table S2. Quick response(s) and recovery time data of PANI (a) PANI-CA-1 (b) PANI-CA-3 (c) sensor as normalized current (I/I_0) to the concentration ranging from 1 to 50 ppm flowed through the measuring chamber (1000 sccm, $V = +0.1$ V) at 80% RH

Response time (s):

<i>Material Name</i>	<i>1 ppm</i>	<i>5 ppm</i>	<i>10 ppm</i>	<i>20 ppm</i>	<i>30 ppm</i>	<i>40 ppm</i>	<i>50 ppm</i>
PANI	96	32	29	25	25	13	9
PANI-CA-1	72	28	26	23	20	10	5
PANI-CA-3	73	28	27	23	20	9	2

Recovery time (min):

<i>Material Name</i>	<i>1 ppm</i>	<i>5 ppm</i>	<i>10 ppm</i>	<i>20 ppm</i>	<i>30 ppm</i>	<i>40 ppm</i>	<i>50 ppm</i>
PANI	5.25	18	30	31.5	34	35	38
PANI-CA-1	16	21	25	28	30	32	35
PANI-CA-3	18	23	27.5	29	33	34	36

Table S3. Repeatability data of PANI (a) PANI-CA-1 (b) PANI-CA-3 (c) sensor as normalized current (I/I_0) to the same concentration of H_2S (20 ppm) flowed through the measuring chamber (1000 sccm, $V = +0.1$ V)

<i>Sensor</i>	<i>trial 1</i>	<i>trial 2</i>	<i>trial 3</i>	<i>Average</i>	<i>SD</i>
<i>PANI</i>	6.68551	6.70123	6.69212	6.692953	0.007893
<i>PANI-CA-1</i>	12.70123	12.80968	12.90968	12.80686	0.104254
<i>PANI-CA-3</i>	13.87278	13.8901	13.90102	13.88797	0.01424

