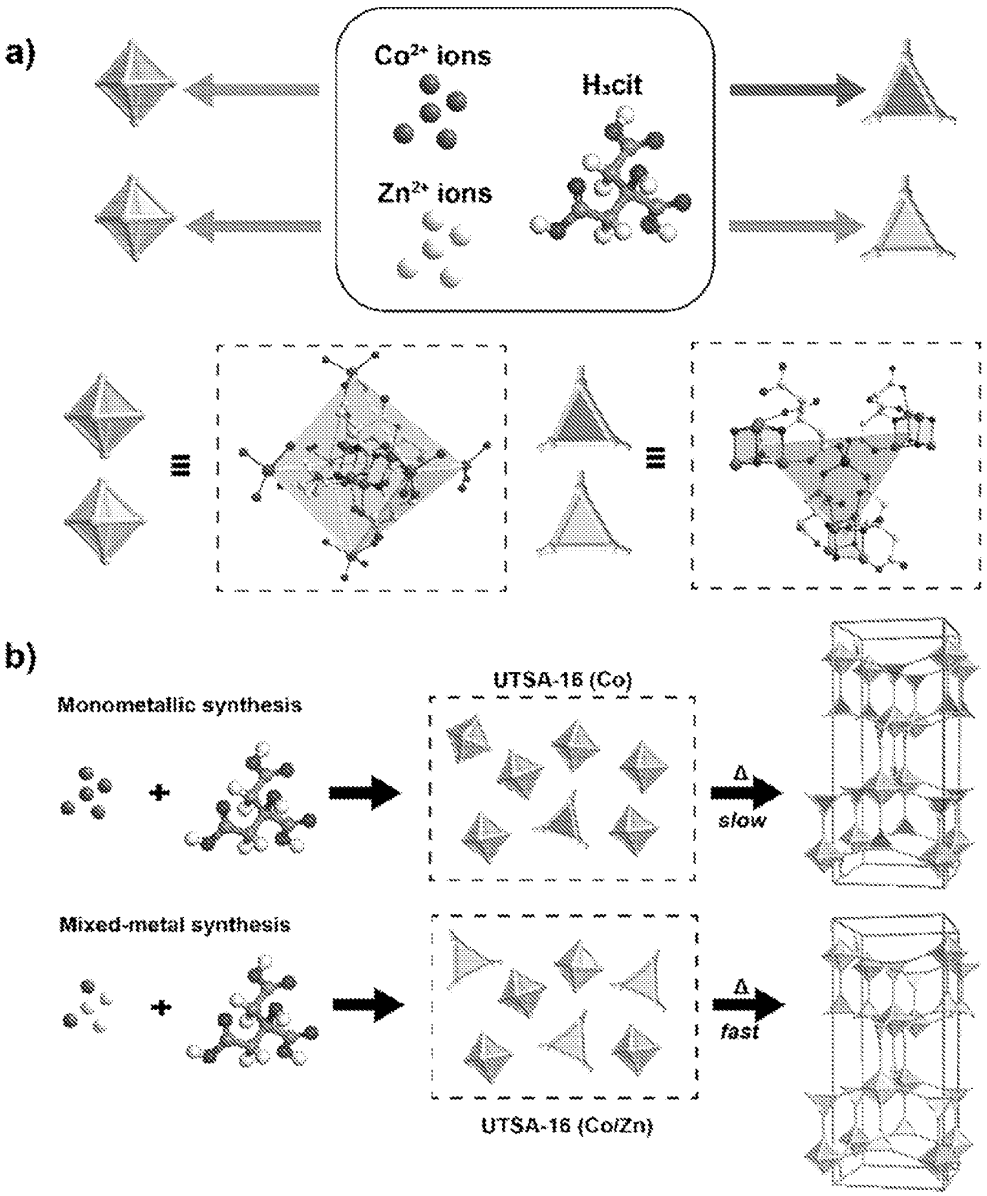
a)
Co^{2+} ions
H_3cit
Zn^{2+} ions
b)
Monometallic synthesis
UTSA-16 (Co)
Δ
slow
Mixed-metal synthesis
Δ
fast
UTSA-16 (Co/Zn)

FIG. 1

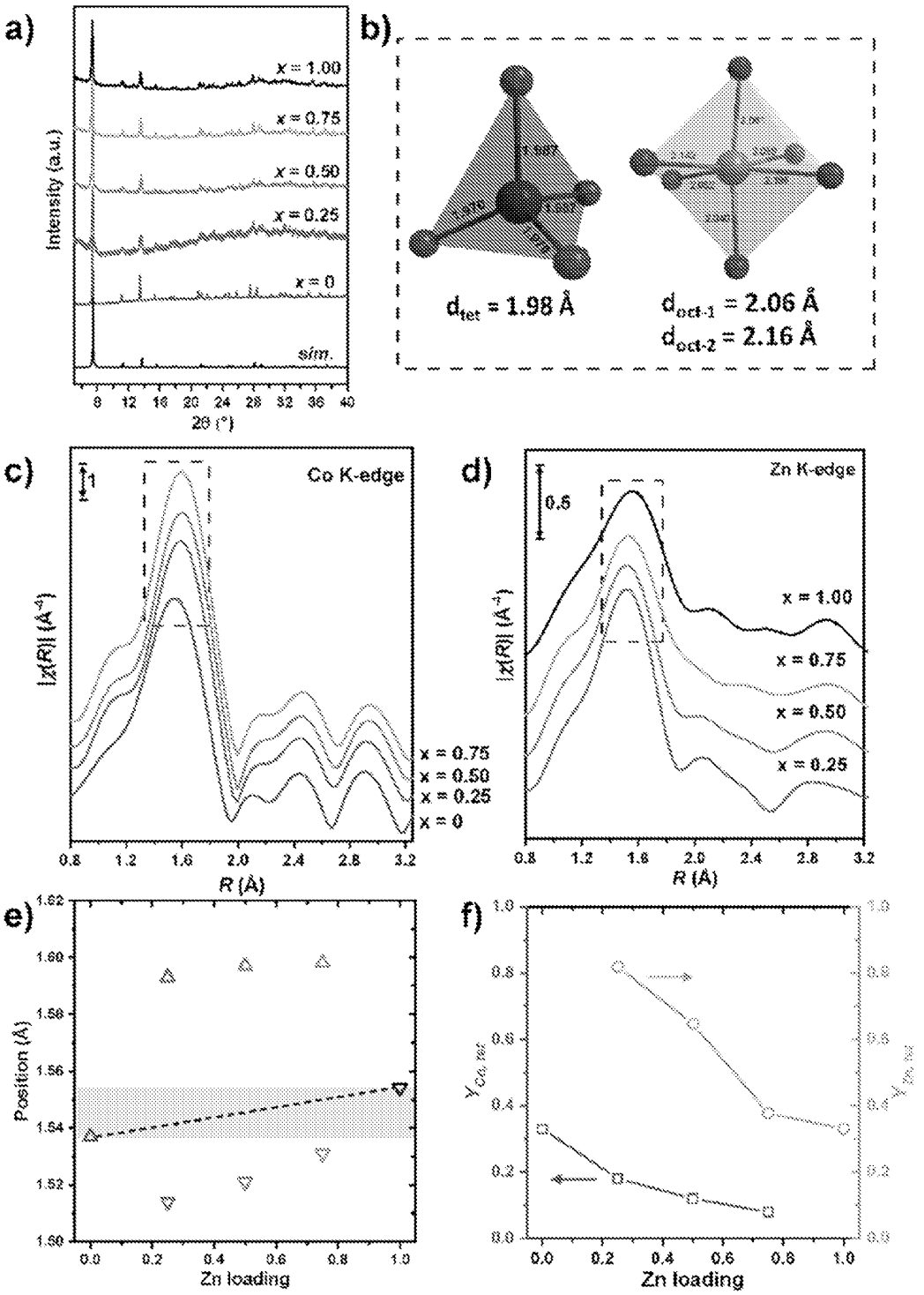
a)
x = 1.00
x = 0.75
x = 0.50
x = 0.25
x = 0
sim.
Intensity (a.u.)
2θ (°)
b)
d_tet = 1.98 Å
d_oct-1 = 2.06 Å
d_oct-2 = 2.16 Å
c)
Co K-edge
|χ(R)| (Å⁻⁴)
R (Å)
x = 0.75
x = 0.50
x = 0.25
x = 0
d)
Zn K-edge
x = 1.00
x = 0.75
x = 0.50
x = 0.25
e)
Position (Å)
Zn loading
f)
Zn loading

FIG. 2

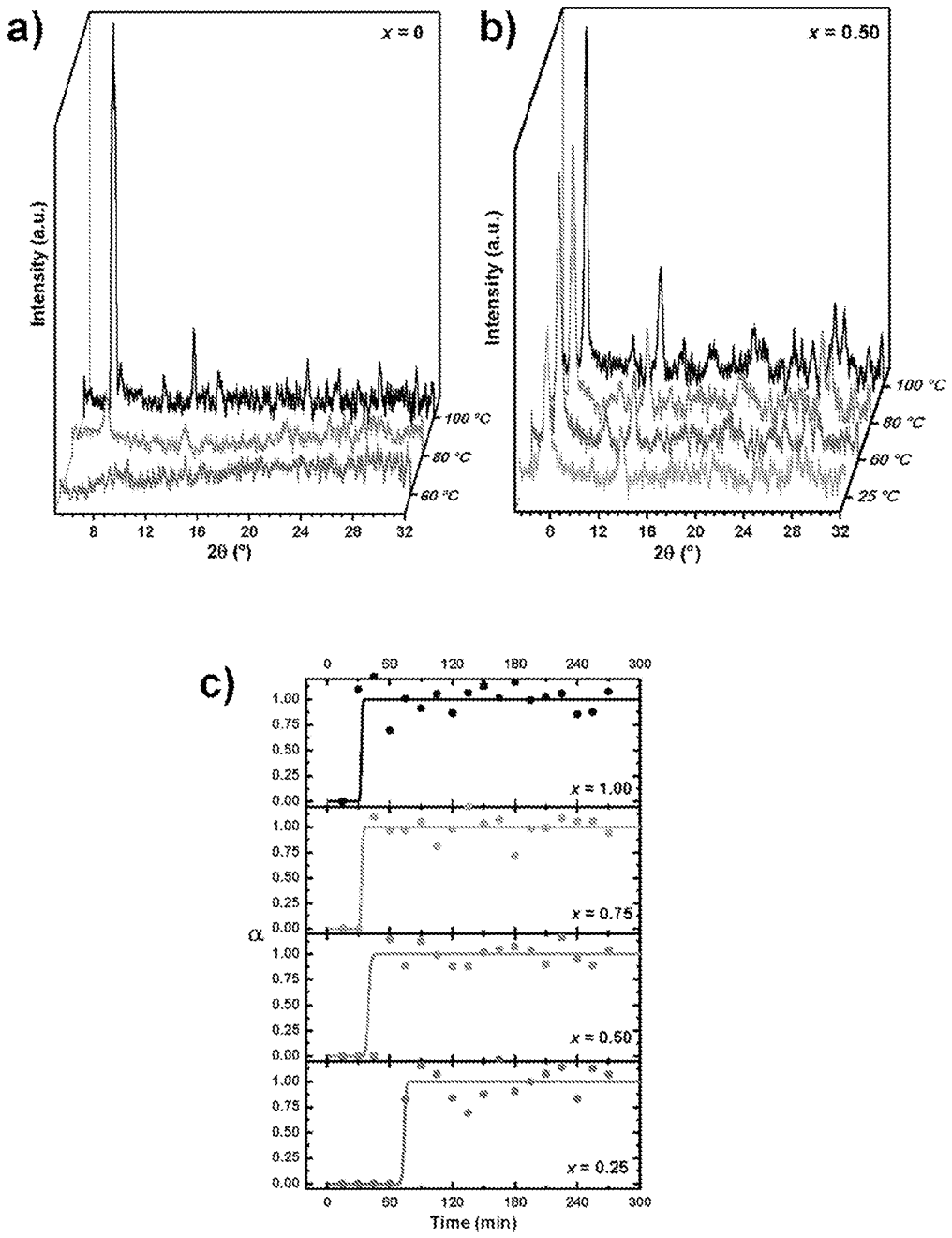
a)
x = 0
Intensity (a.u.)
100 °C
80 °C
60 °C
8 12 16 20 24 28 32
2θ (°)
b)
x = 0.50
Intensity (a.u.)
100 °C
80 °C
60 °C
25 °C
8 12 16 20 24 28 32
2θ (°)
c)
0 60 120 180 240 300
1.00
0.75
0.50
0.25
0.00
x = 1.00
x = 0.75
x = 0.50
x = 0.25
α
Time (min)

FIG. 3

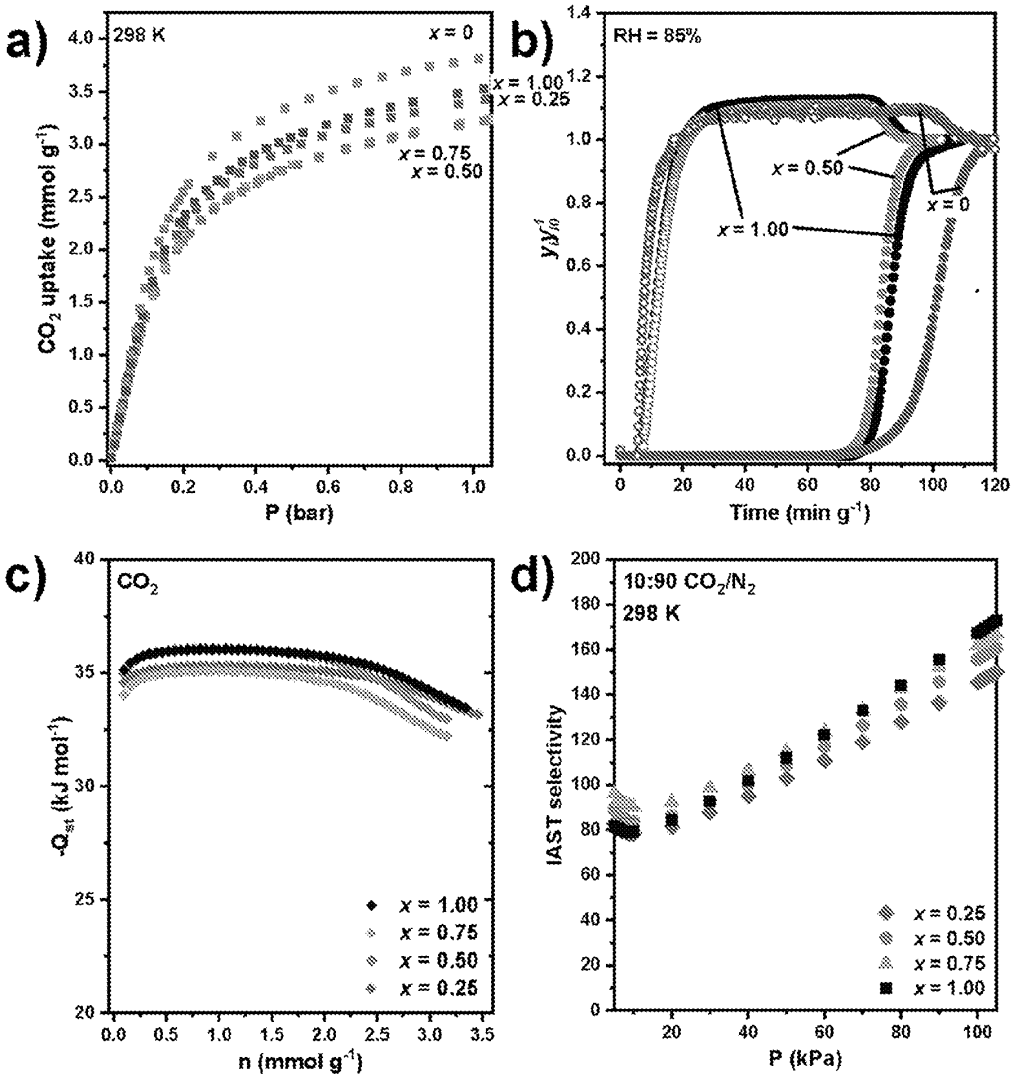
a)
298 K
x = 0
x = 1.00
x = 0.25
x = 0.75
x = 0.50
CO2 uptake (mmol g-1)
P (bar)
b)
RH = 85%
x = 0.50
x = 0
x = 1.00
y/y0
Time (min g-1)
c)
CO2
x = 1.00
x = 0.75
x = 0.50
x = 0.25
-Qst (kJ mol-1)
n (mmol g-1)
d)
10:90 CO2/N2
298 K
x = 0.25
x = 0.50
x = 0.75
x = 1.00
IAST selectivity
P (kPa)

FIG. 4

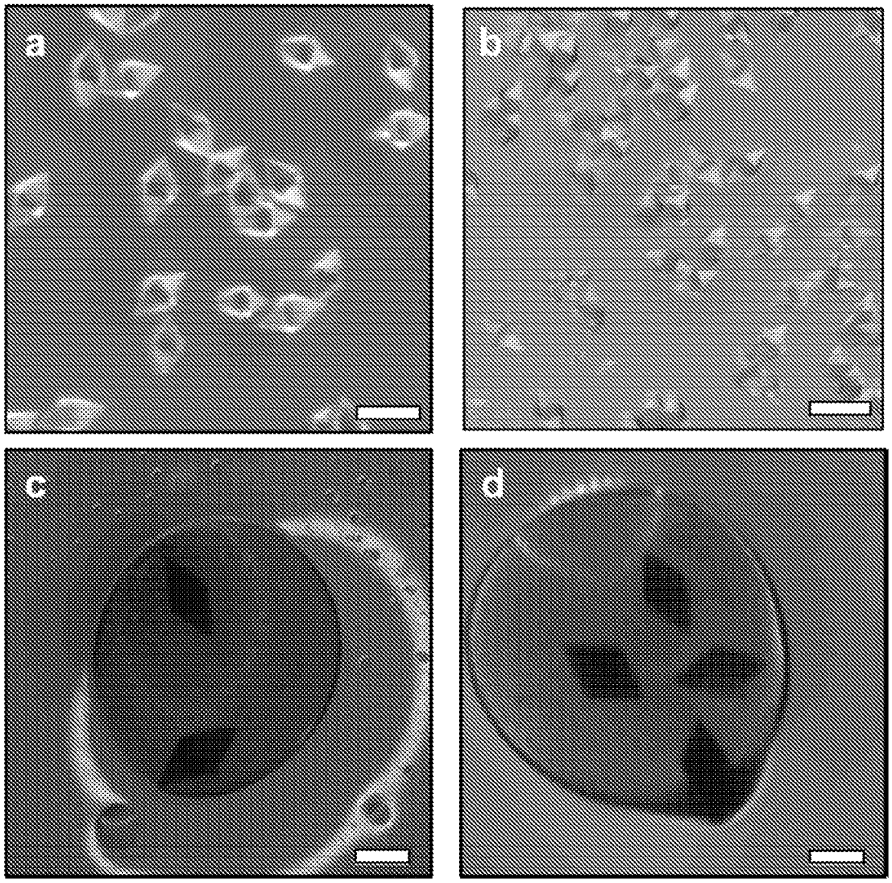
a
b
c
d

FIG. 5

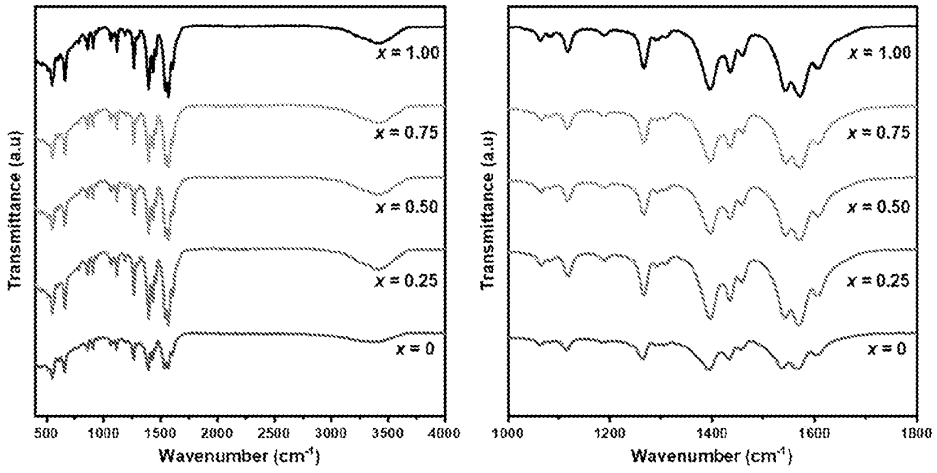
x = 1.00
x = 0.75
x = 0.50
x = 0.25
x = 0
Transmittance (a.u)
500 1000 1500 2000 2500 3000 3500 4000
Wavenumber (cm-1)
1000 1200 1400 1600 1800
Wavenumber (cm-1)

FIG. 6

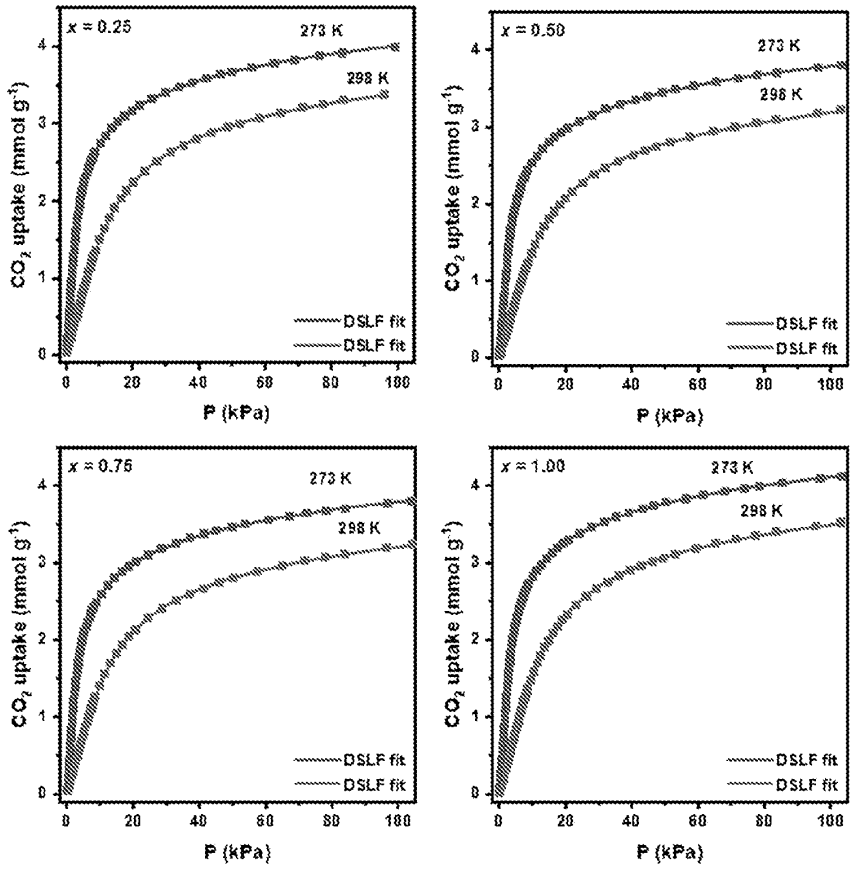
x = 0.25
273 K
298 K
DSLF fit
DSLF fit
CO2 uptake (mmol g-1)
P (kPa)
x = 0.50
273 K
298 K
DSLF fit
DSLF fit
CO2 uptake (mmol g-1)
P (kPa)
x = 0.75
273 K
298 K
DSLF fit
DSLF fit
CO2 uptake (mmol g-1)
P (kPa)
x = 1.00
273 K
298 K
DSLF fit
DSLF fit
CO2 uptake (mmol g-1)
P (kPa)

FIG. 7

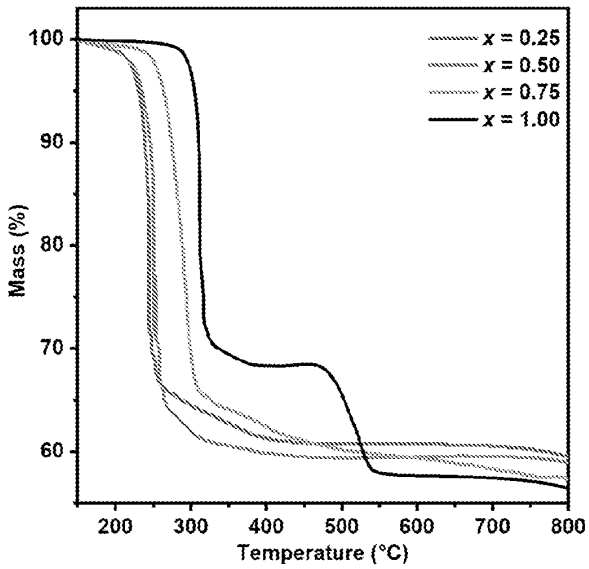
x = 0.25
x = 0.50
x = 0.75
x = 1.00
Mass (%)
Temperature (°C)

FIG. 8

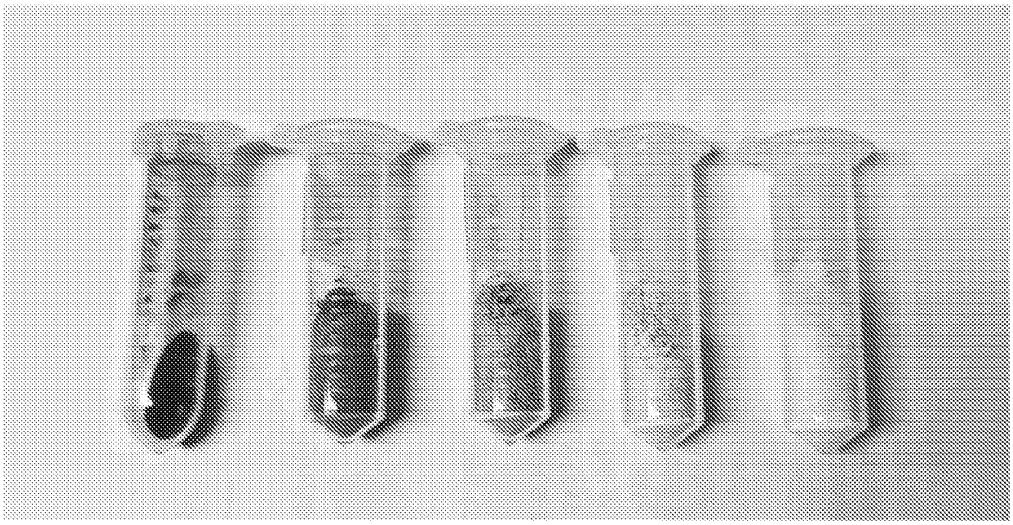

FIG. 9

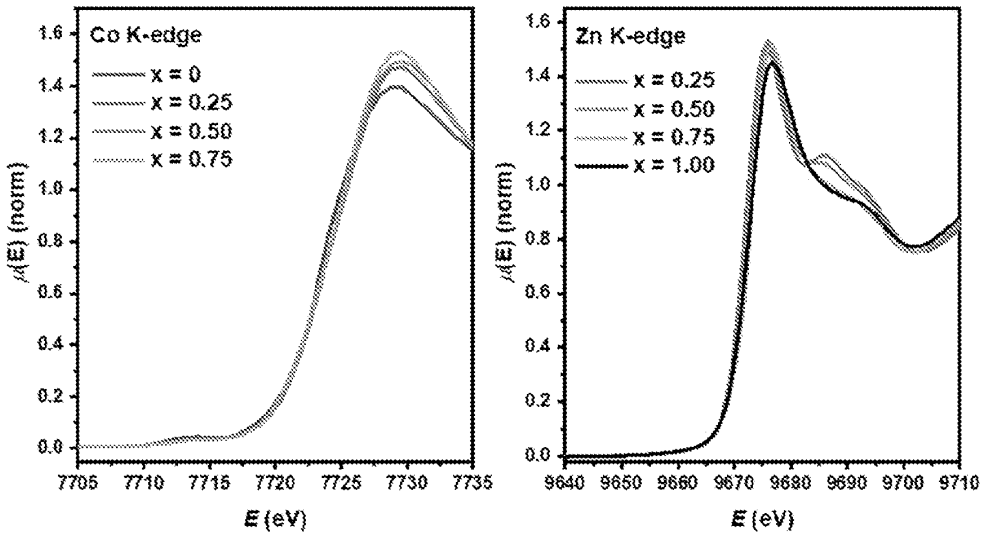
Co K-edge
x = 0
x = 0.25
x = 0.50
x = 0.75
μ(E) (norm)
E (eV)
Zn K-edge
x = 0.25
x = 0.50
x = 0.75
x = 1.00
μ(E) (norm)
E (eV)

FIG. 10

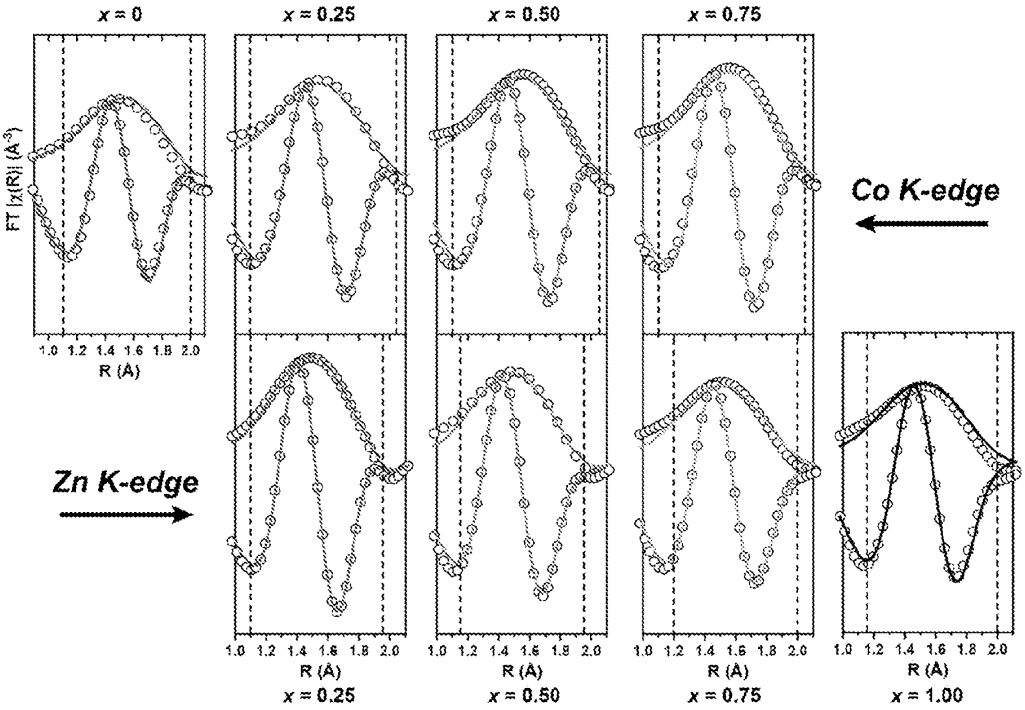
x = 0
x = 0.25
x = 0.50
x = 0.75
FT |χ(R)| (Å⁻³)
R (Å)
Co K-edge
Zn K-edge
x = 0.25
x = 0.50
x = 0.75
x = 1.00

FIG. 11

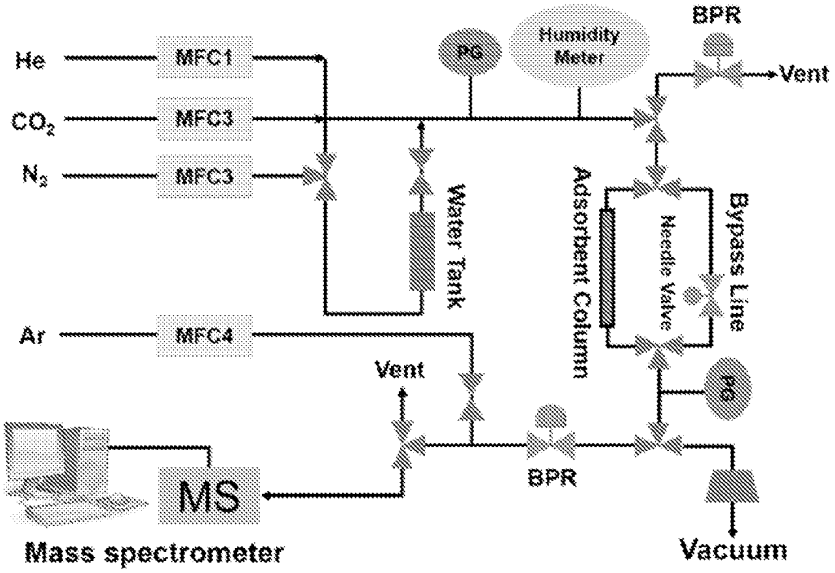
He
MFC1
CO2
MFC3
N2
MFC3
Ar
MFC4
PG
Humidity Meter
BPR
Vent
Water Tank
Adsorbent Column
Needle Valve
Bypass Line
Vent
PG
BPR
MS
Mass spectrometer
Vacuum

FIG. 12

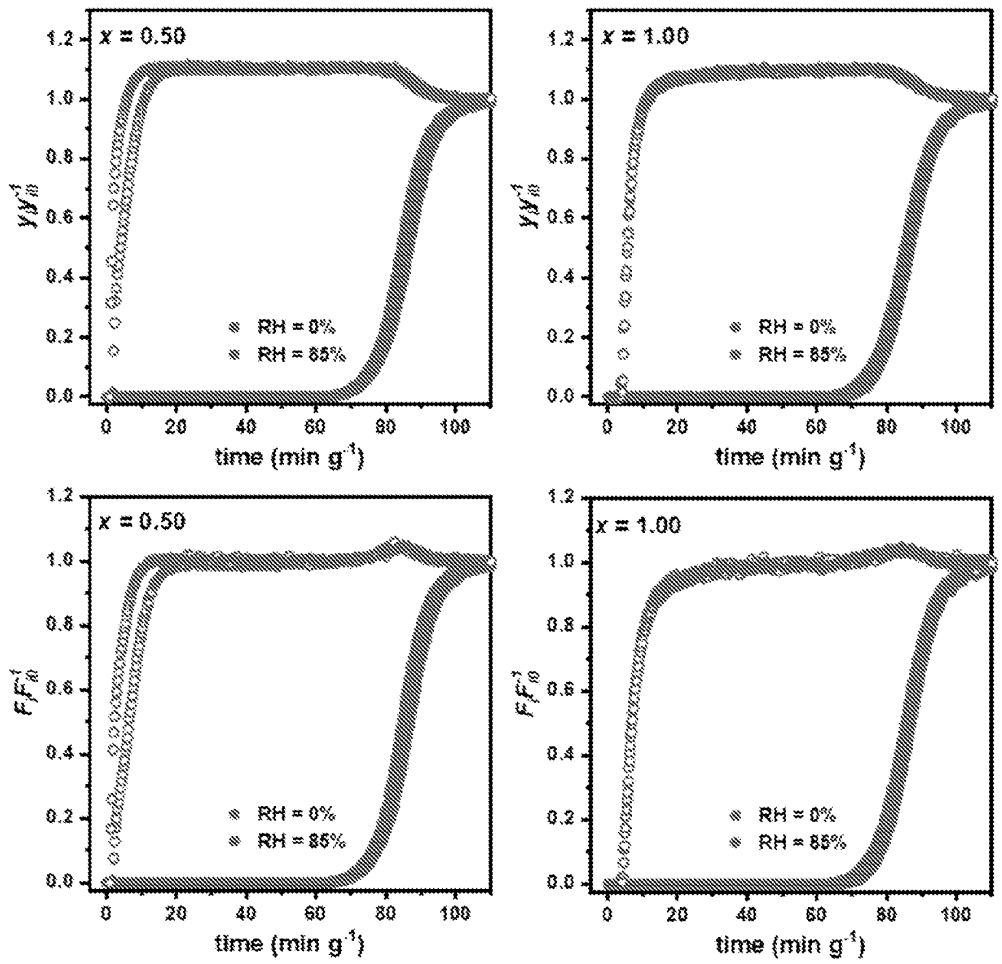

FIG. 13