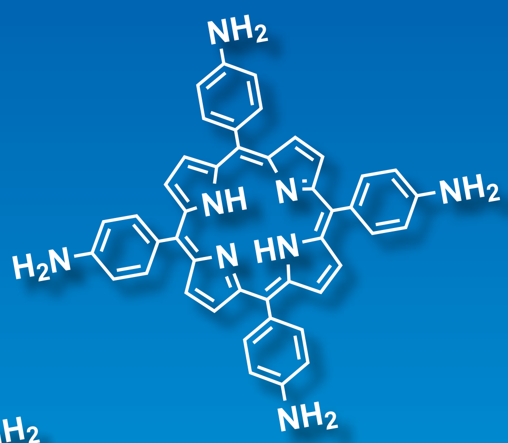
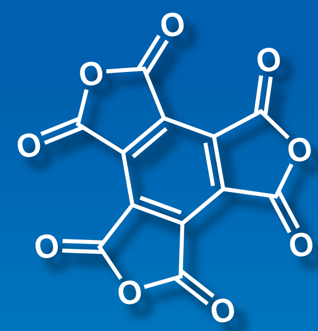
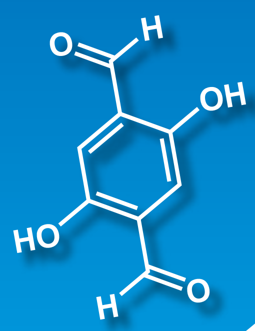
MATERIALS

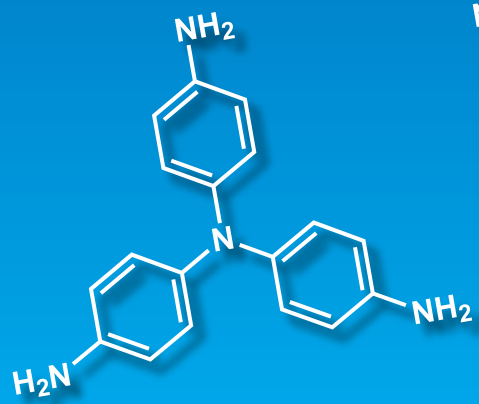
TCI

Covalent Organic Framework (COF) Linkers









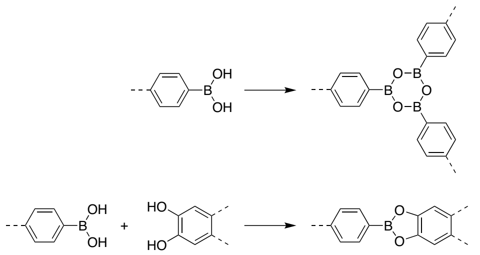
- Amine Linkers
- Aldehyde Linkers
- Carboxylic Anhydride Linkers
- Boronic Acid Linkers
- Other Linkers

Covalent Organic Framework (COF) Linkers

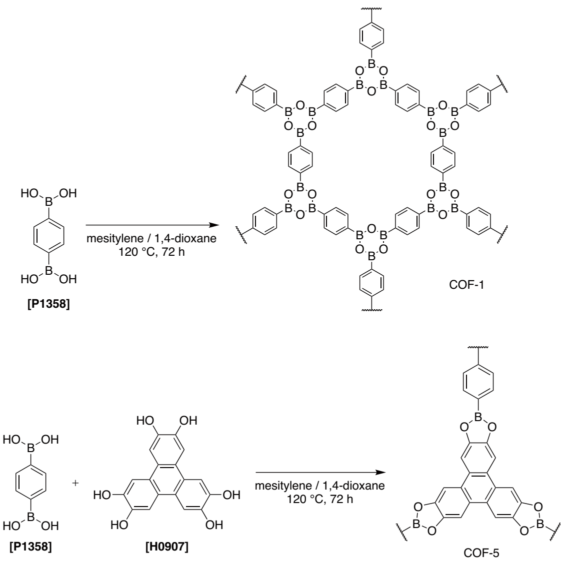
Covalent organic frameworks (COFs) are crystalline organic frameworks consisting of a network structure made of covalent bonds.[1,2] COFs are classified as porous crystalline materials similar to metal-organic frameworks (MOFs)/porous coordination polymers (PCPs) and zeolites. They include 2D COFs, which are constructed by stacking layers of 2D covalently bonded sheets, and 3D COFs, which are constructed by 3D connected frameworks. COFs are expected to be used as molecular storage or separation materials, catalysts, electronic materials, energy storage materials, battery materials, and drug delivery materials, due to their porosity, crystallinity, and structural diversity.

COFs are designed and synthesized by combining monomers, also known as linkers, according to intended topology. Some synthetic examples are shown below with synthetic strategies.

● Boroxines and boronic esters

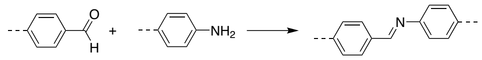


The self-condensation of boronic acids to produce boroxines and the condensation of boronic acids and catechols to produce boronic esters are the first synthetic strategies to synthesize COFs (Scheme 1).[1] The advantages of boroxine-based COFs and boronic ester-based COFs include their tendency to have good crystallinity, large surface area, and high thermal stability.

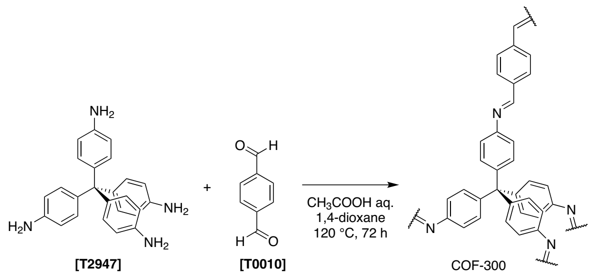


Scheme 1. Synthesis of COF-1 and COF-5[1]

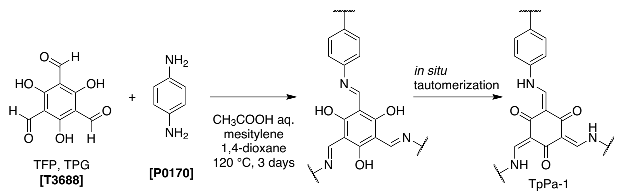
● Imines



Imine-linked covalent organic framework, synthesized by condensation of aldehydes and amines, was first reported in 2009 (Scheme 2),[4] and imine-based COFs are now the most widely reported COFs. Imine-based COFs have higher chemical stability compared to boroxines and boronic esters. In addition, several researchers have reported post-synthetic modification or functionalization of imine-based COFs, such as the synthesis of COFs for CO_2 capture through the post-synthetic modification and functionalization of imine-based structures.[5] In 2012, it was reported that β-ketoenamine-type COFs can be synthesized by using 2,4,6-triformylphloroglucinol (TPG, TFP) as an aldehyde linker (Scheme 3).[6] These compounds have recently received a lot of attention due to their stability towards acids and bases.

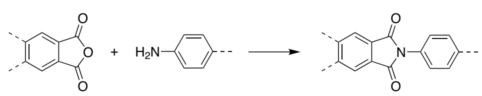


Scheme 2. Synthesis of COF-300[4]



Scheme 3. Synthesis of TpPa-1[6]

● Imides



Imide-linked COFs obtained by condensation of carboxylic anhydrides and amines have also been reported[7] and are expected to be applied to battery materials[8] and CO_2 capture materials.[9]

● Other synthetic strategies

COFs constructed by other linkers besides imines, imides, and boroxines have been realized. Linkers other than amines, aldehydes, carboxylic anhydrides, and boronic acids are used as linkers to prepare these COFs. For example, hydrazone-type

COFs synthesized using hydrazines and aldehydes[10,11] and ionic COFs synthesized using 1,2,3-triaminoguanidinium chloride[12] were reported.

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https://doi.org/10.1021/jacs.7b12292

Amine Linkers

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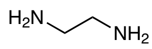
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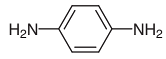
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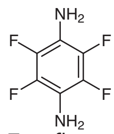
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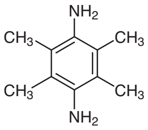
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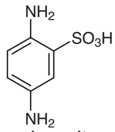
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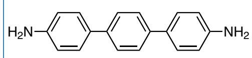
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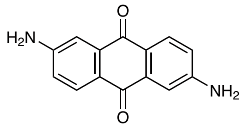
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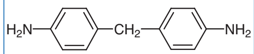
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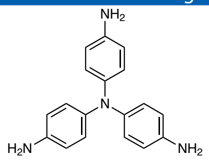
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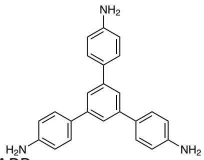
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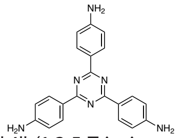
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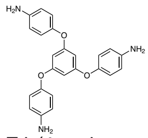
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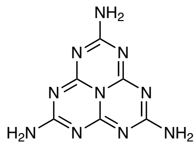
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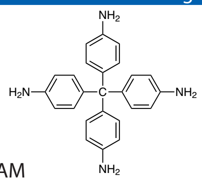
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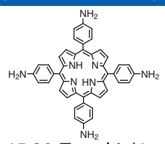
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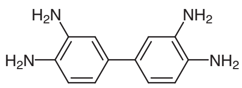
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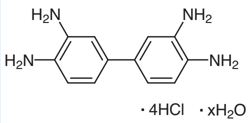
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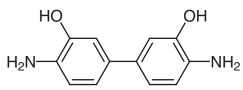
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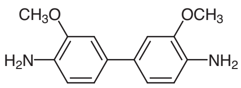
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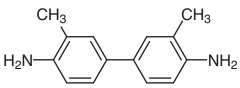
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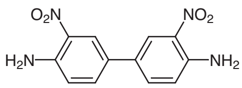
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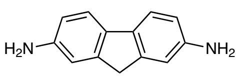
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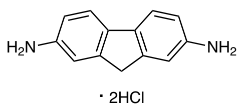
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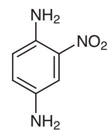
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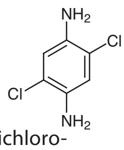
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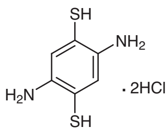
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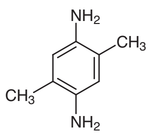
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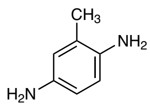
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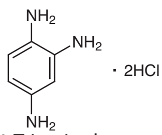
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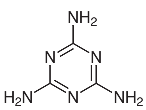
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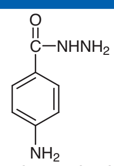
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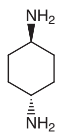
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Aldehyde Linkers

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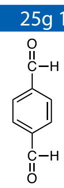
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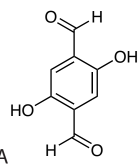
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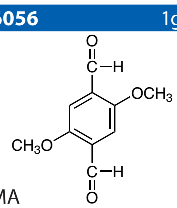
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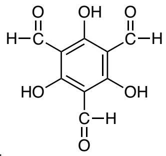
T3688 200mg 1g



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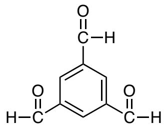

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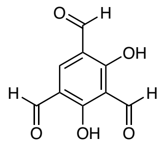
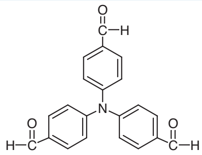


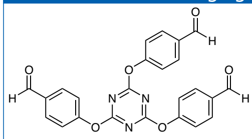
2,4,6-Triformylresorcinol
CAS RN: 58343-11-6

T2310 500mg



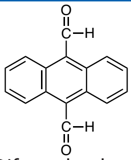
Tris(4-formylphenyl)amine
CAS RN: 119001-43-3

T4077 1g 5g



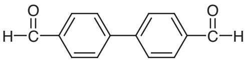
2,4,6-Tris(4-formylphenoxy)-1,3,5-triazine
CAS RN: 3140-75-8

A2664 1g 5g



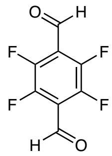
9,10-Diformylanthracene
CAS RN: 7044-91-9

B2854 1g 5g



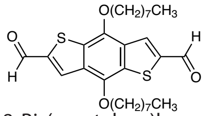
BPDA
CAS RN: 66-98-8

T4088 1g 5g



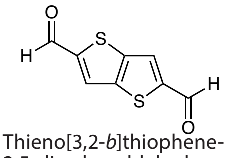
TFTA
CAS RN: 3217-47-8

B5484 200mg



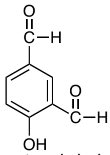
4,8-Bis(*n*-octyloxy)benzo-[1,2-*b*:4,5-*b*']dithiophene-2,6-dicarbaldehyde
CAS RN: 1668554-22-0

T3212 200mg 1g



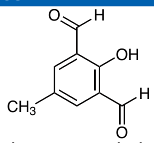
Thieno[3,2-*b*]thiophene-2,5-dicarboxaldehyde
CAS RN: 37882-75-0

F0310 1g 5g 25g



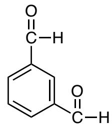
4-Hydroxyisophthalaldehyde
CAS RN: 3328-70-9

H0683 1g 5g



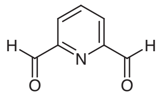
2-Hydroxy-5-methyl-isophthalaldehyde
CAS RN: 7310-95-4

I0153 25g 100g 250g



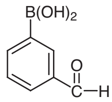
Isophthalaldehyde
CAS RN: 626-19-7

P0949 1g 5g



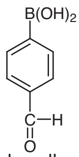
2,6-Pyridinedicarboxaldehyde
CAS RN: 5431-44-7

F0445 1g 5g 25g



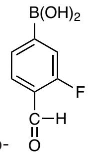
3-Formylphenylboronic Acid
CAS RN: 87199-16-4

F0446 1g 5g



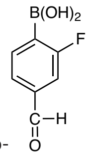
4-Formylphenylboronic Acid
CAS RN: 87199-17-5

F1051 1g 5g



3-Fluoro-4-formylphenylboronic Acid
CAS RN: 248270-25-9

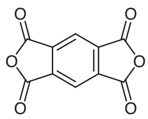
F1079 1g



2-Fluoro-4-formylphenylboronic Acid
CAS RN: 871126-22-6

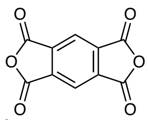
Carboxylic Anhydride Linkers

B0040 25g 100g 500g



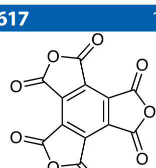
PMDA
CAS RN: 89-32-7

P2103 5g 25g



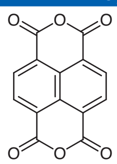
PMDA
(purified by sublimation)
CAS RN: 89-32-7

M3617 1g 5g



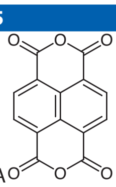
Mellitic Trianhydride
CAS RN: 4253-24-1

N0369 25g 250g



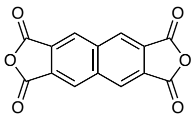
NTCDA
CAS RN: 81-30-1

N0755 1g 5g



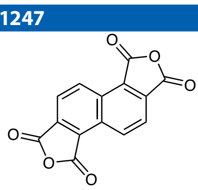
NTCDA
(purified by sublimation)
CAS RN: 81-30-1

N1128 1g 5g



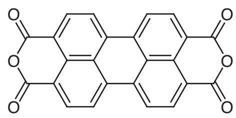
2,3,6,7-NTCDA
CAS RN: 3711-01-1

N1247 1g



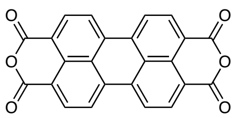
1,2,5,6-NTCDA
CAS RN: 3711-03-3

P0972 25g 100g 500g



PTCDA
CAS RN: 128-69-8

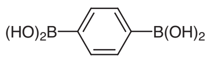
P2102 1g



PTCDA
(purified by sublimation)
CAS RN: 128-69-8

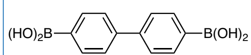
Boronic Acid Linkers

P1358 1g 5g 25g



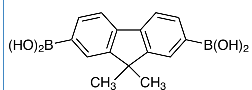
BDBA
CAS RN: 4612-26-4

B2490 1g 5g



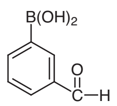
BPDA
CAS RN: 4151-80-8

D4701 1g



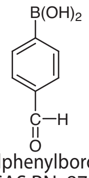
(9,9-Dimethyl-9*H*-fluorene-2,7-diyl)diboronic Acid
CAS RN: 866100-14-3

F0445 1g 5g 25g



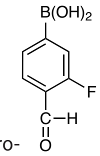
3-Formylphenylboronic Acid
CAS RN: 87199-16-4

F0446 1g 5g



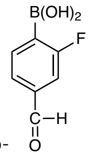
4-Formylphenylboronic Acid
CAS RN: 87199-17-5

F1051 1g 5g



3-Fluoro-4-formylphenylboronic Acid
CAS RN: 248270-25-9

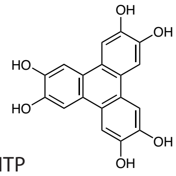
F1079 1g



2-Fluoro-4-formylphenylboronic Acid
CAS RN: 871126-22-6

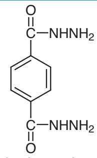
Other Linkers

H0907 1g 5g



HHTP
CAS RN: 4877-80-9

T0758 25g 500g



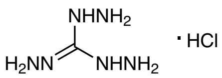
Terephthalic Dihydrazide
CAS RN: 136-64-1

H0172 25mL 500mL

$H_2NNH_2 \cdot H_2O$

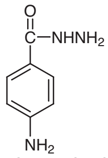
Hydrazine Monohydrate
CAS RN: 7803-57-8

T4080 1g 5g



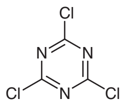
N,*N*',*N*''-Triaminoguanidine Hydrochloride
CAS RN: 5329-29-3

A1211 25g



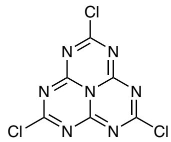
4-Aminobenzohydrazide
CAS RN: 5351-17-7

C0460 25g 500g



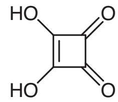
Cyanuric Chloride
CAS RN: 108-77-0

T4145 1g



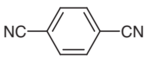
Heptazine Chloride
CAS RN: 6710-92-5

D1399 5g 25g



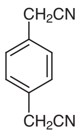
Squaric Acid
CAS RN: 2892-51-5

T0016 25g 100g 500g



Terephthalonitrile
CAS RN: 623-26-7

X0061 5g 25g



1,4-Phenylenediacetonitrile
CAS RN: 622-75-3

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