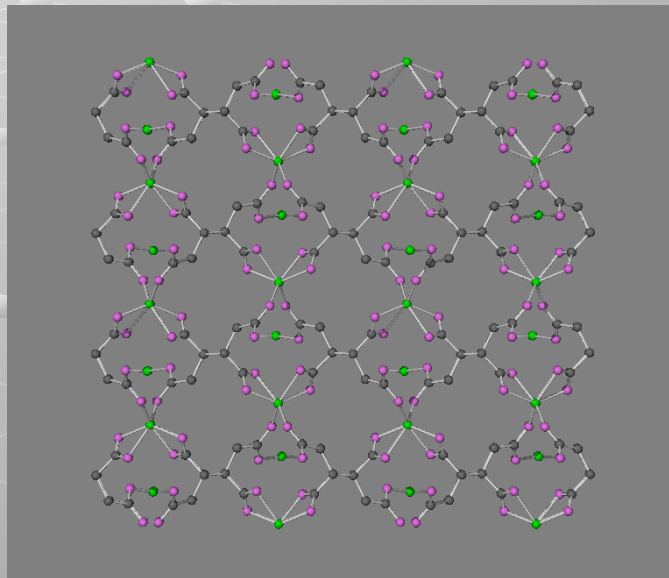


INSTITUTE OF  
MATERIALS SCIENCE  
AND COMPUTING

## *Synthetic Coordination Chemistry*

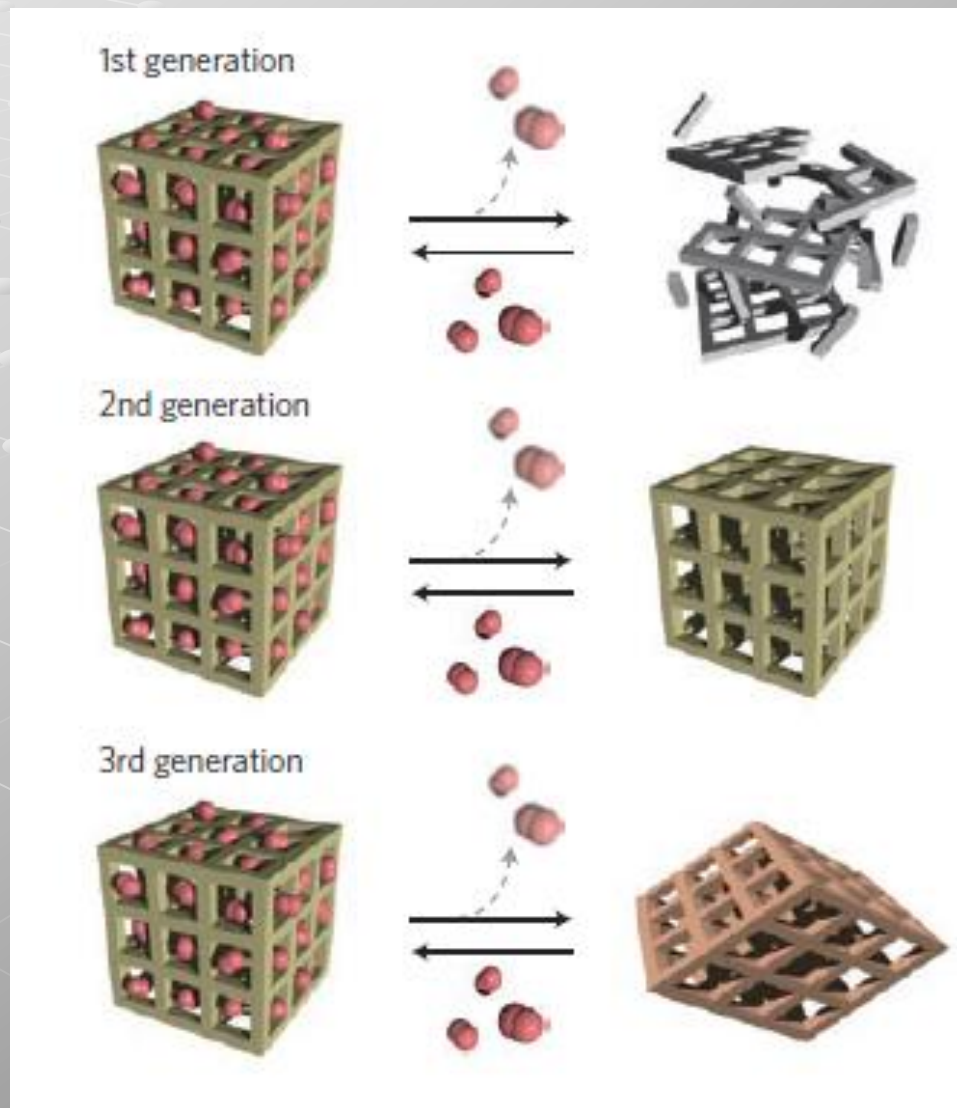


*John C. Plakatouras*

*Laboratory of Inorganic Chemistry  
Department of Chemistry,  
University of Ioannina, Greece*

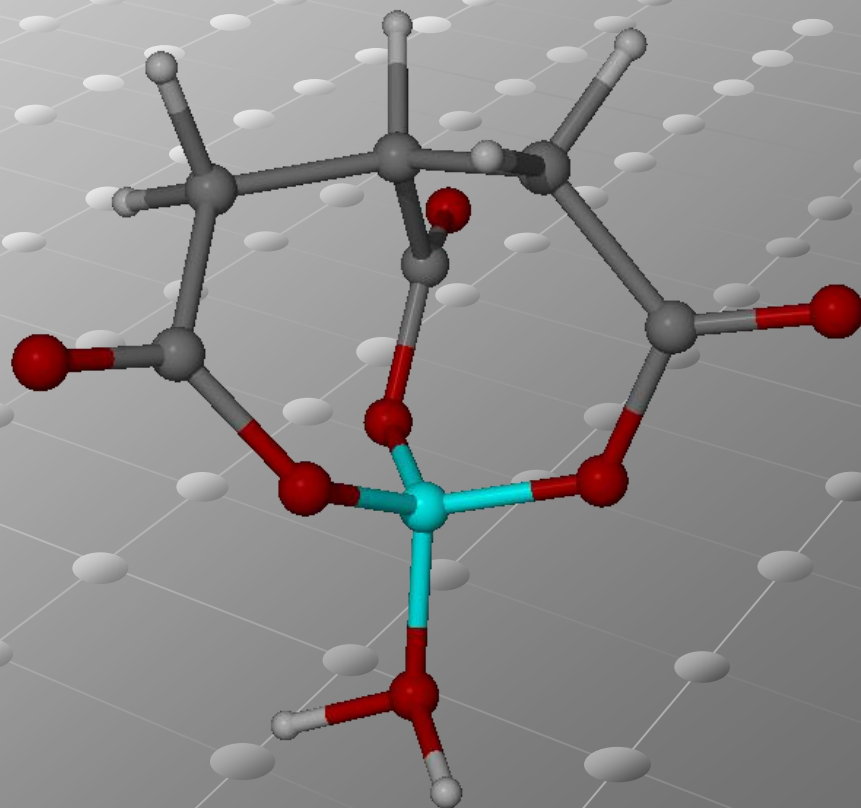
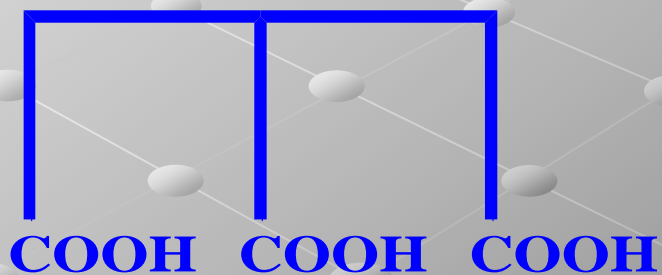


# MOFs

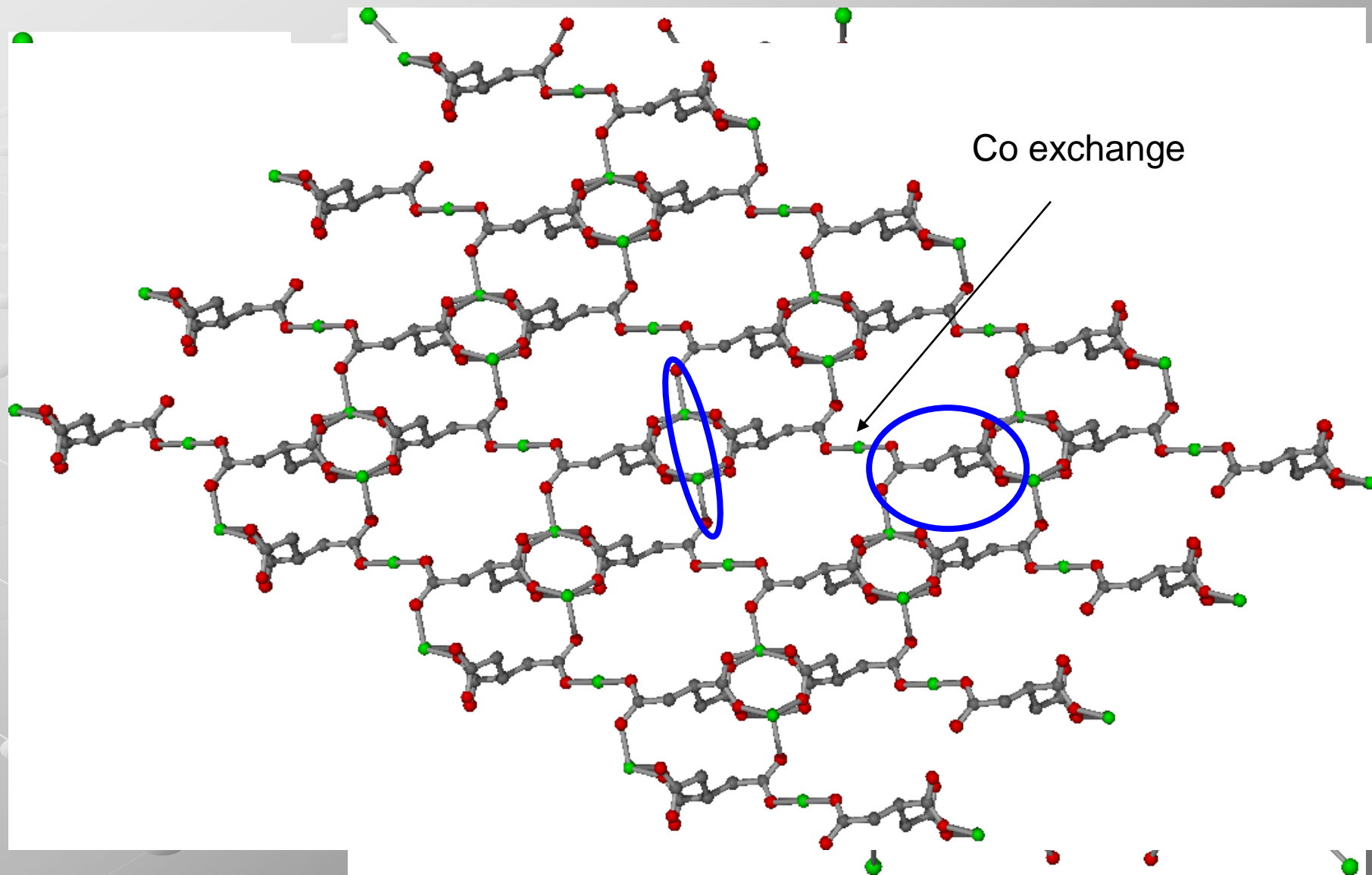


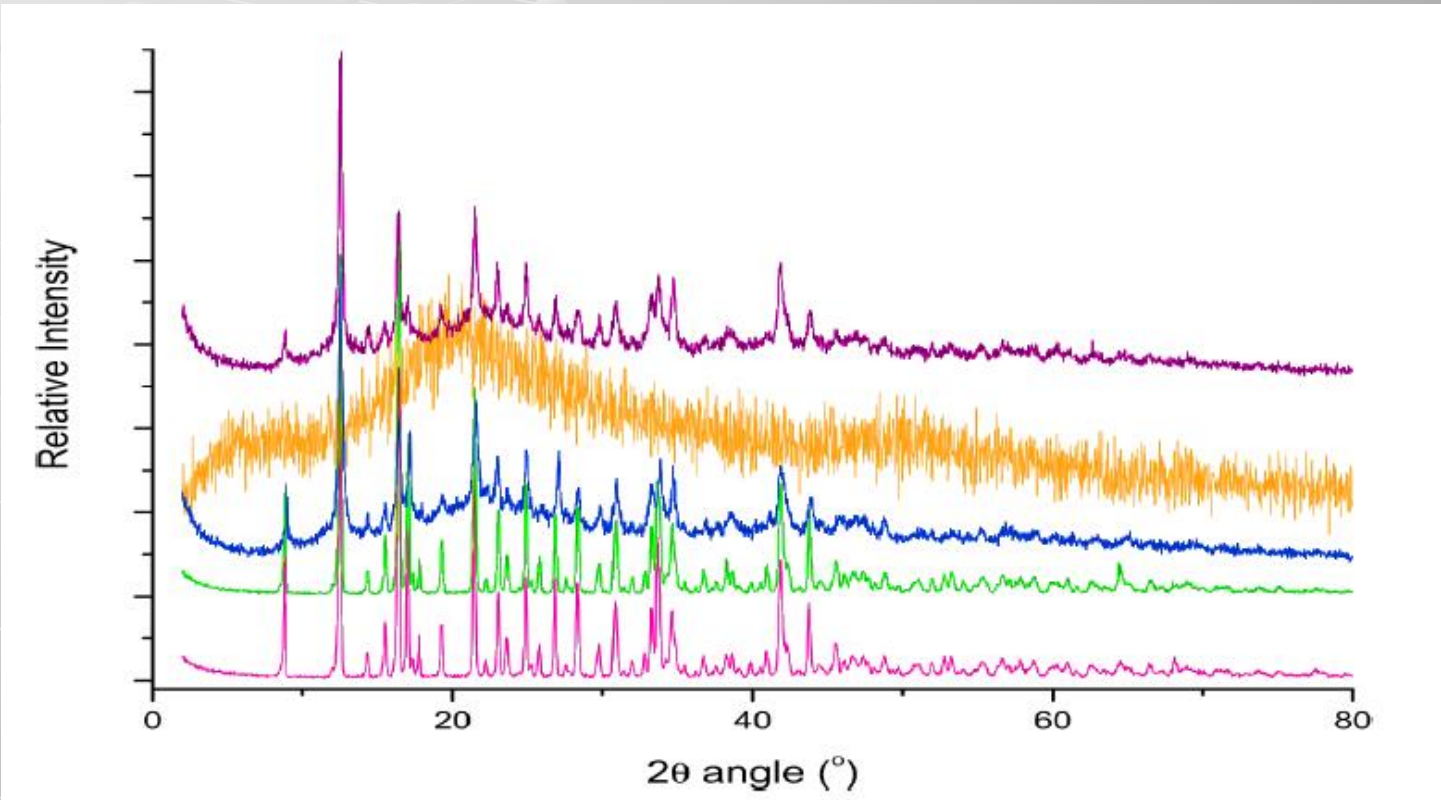
# Bioinorganic Chemistry

Tricarballic acid  
1,2,3-propanetricarboxylic acid



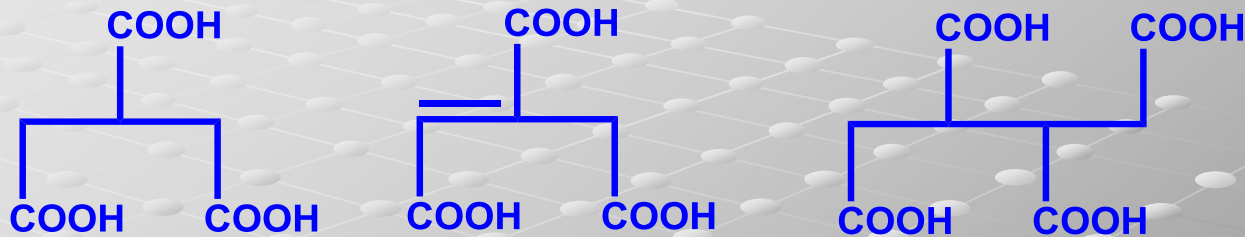
$\text{Zn}^{2+} / \text{PTC}^{3-}$ ,  $[\text{Zn}_3(\text{PTC})_2(\text{H}_2\text{O})_4]_n \cdot 2n\text{H}_2\text{O}$ , 3D polymer, hexadentate  
 $\mu_6$ -carboxylate



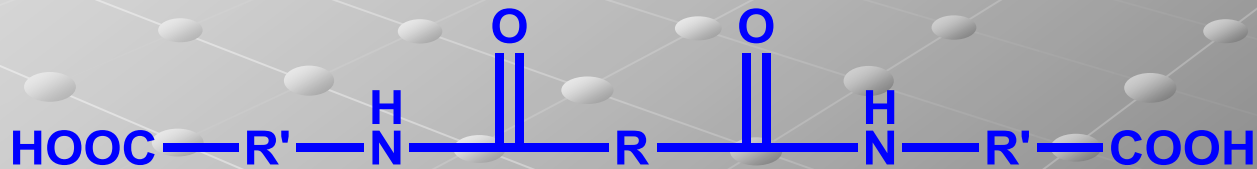


# Ligand Families

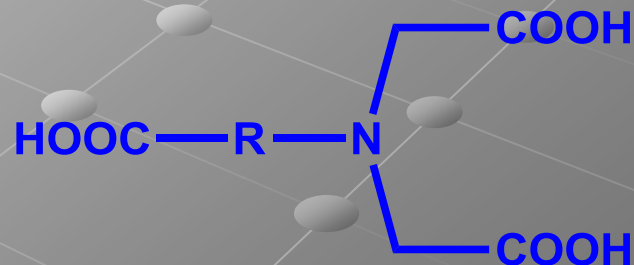
## Open Chain Polycarboxylates



## Pseudopeptides



## Iminodiacetates



a. Open chain polycarboxylates

1,2,3-propanetricarboxylic acid

PTCH<sub>3</sub>

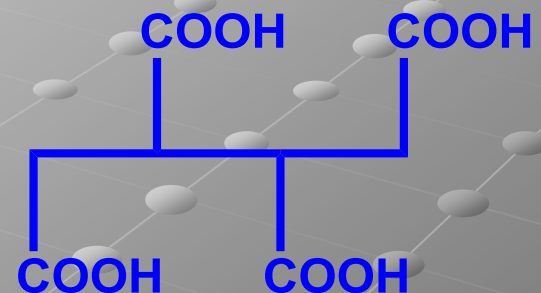
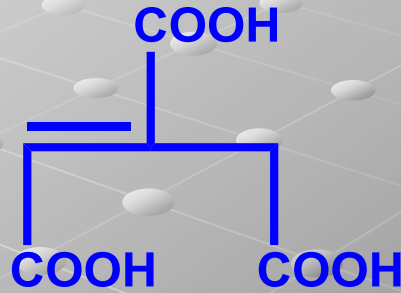
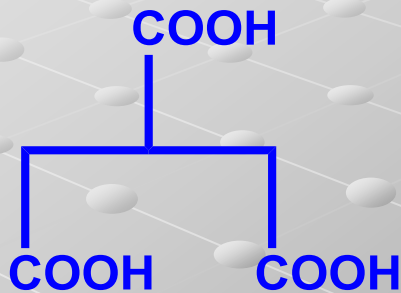
1,2,3,4-butanetetracarboxylic acid

BTCH<sub>4</sub>

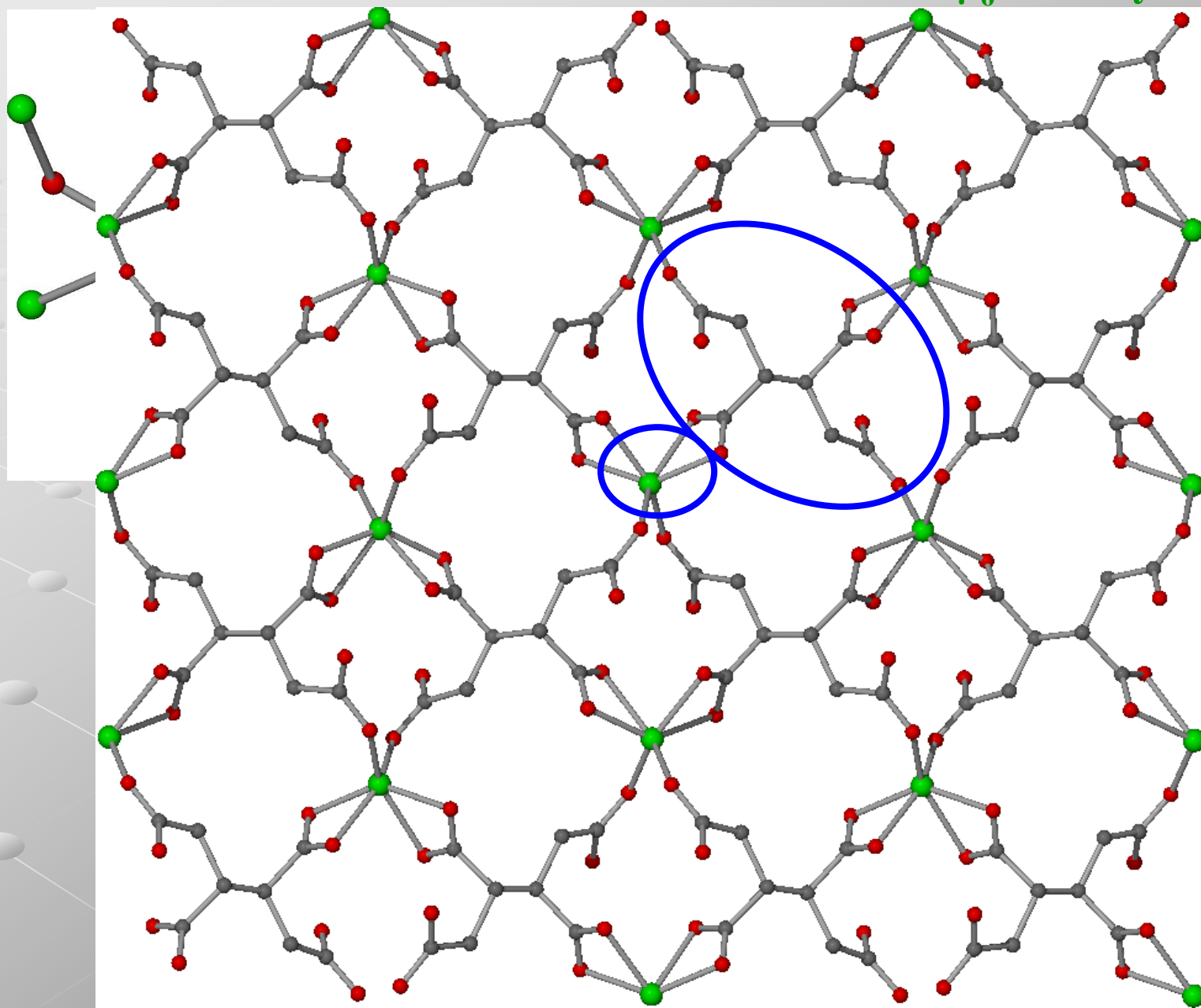
*trans*-1,2,3-propenetricarboxylic acid

TAAH<sub>3</sub>

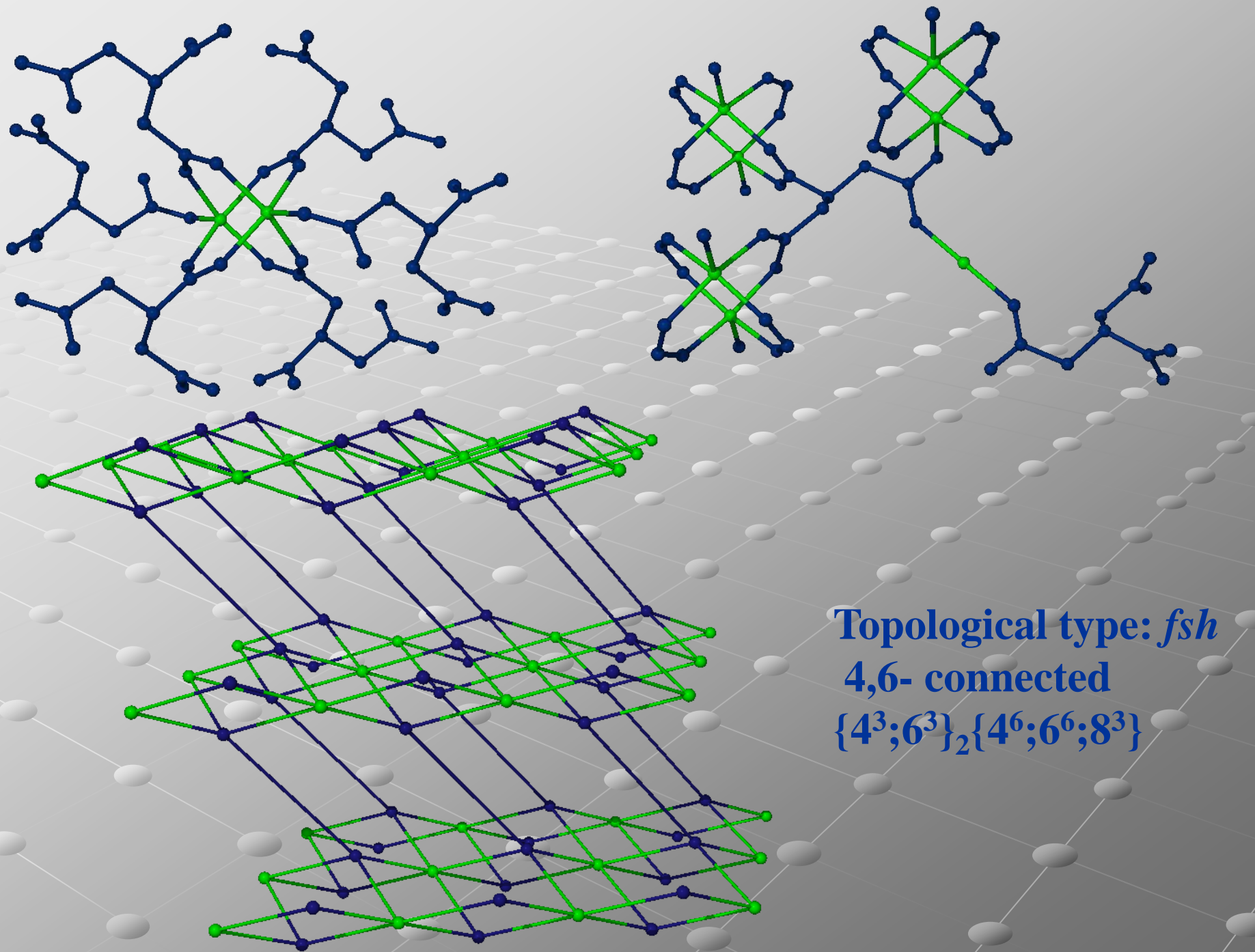
+ Lewis bases

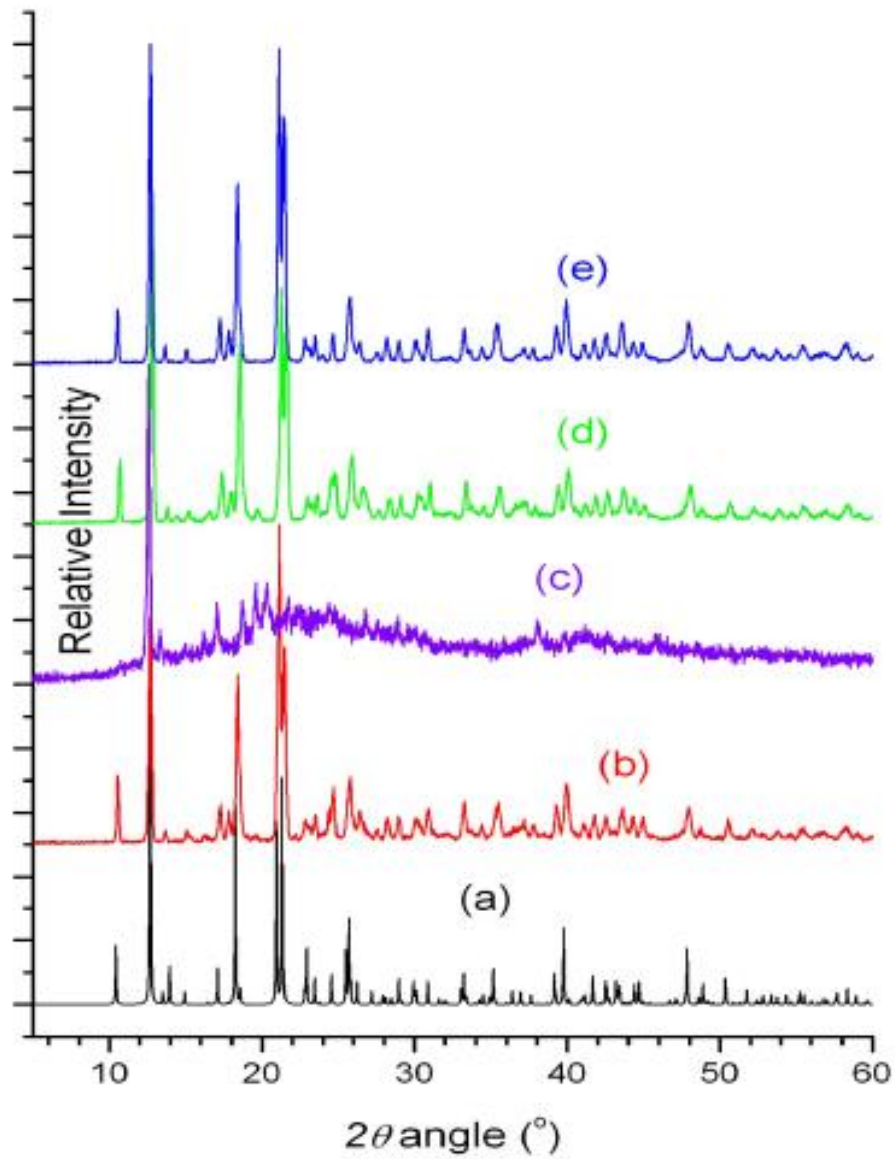


$\text{Zn}^{2+} / \text{BTC}^{4-}$ ,  $[\text{Zn}_2(\text{BTC})(\text{H}_2\text{O})_4]_n \cdot 2n\text{H}_2\text{O}$ , 3D polymer, Octadentate  $\mu_6$ -carboxylate

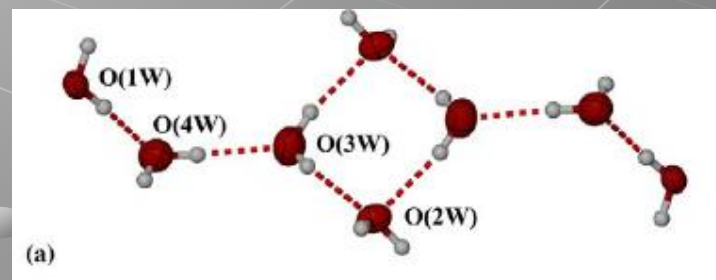
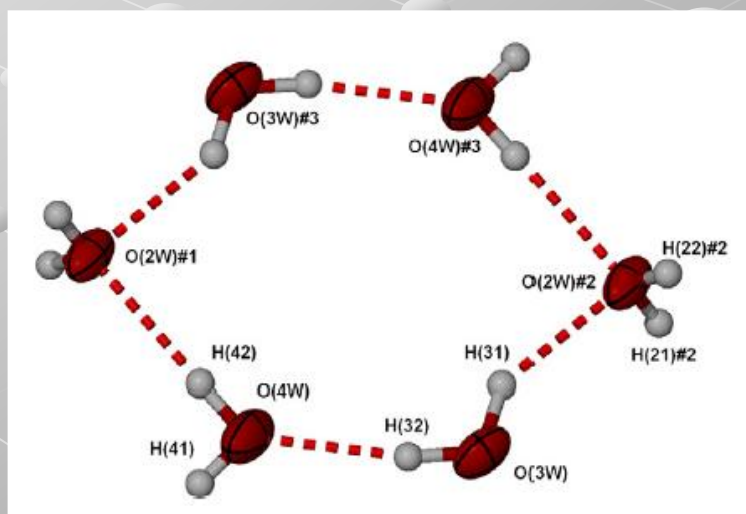
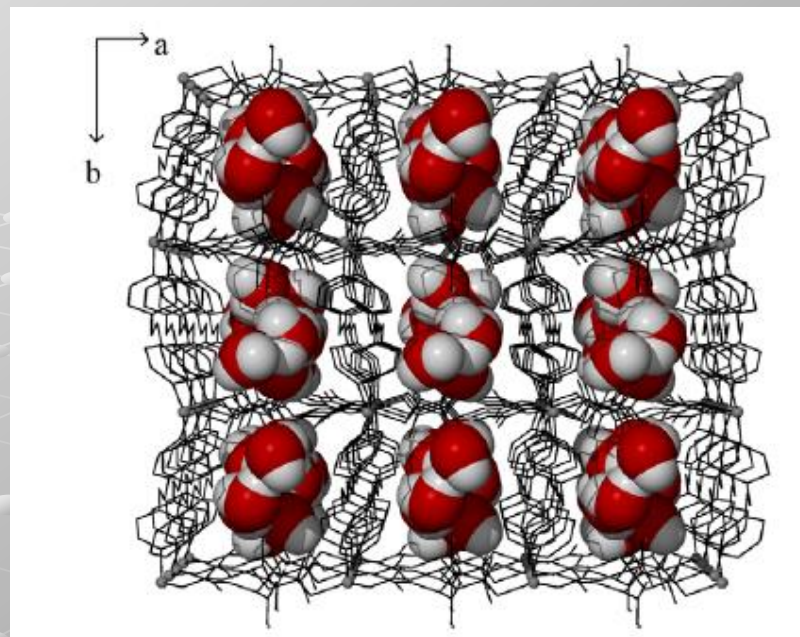
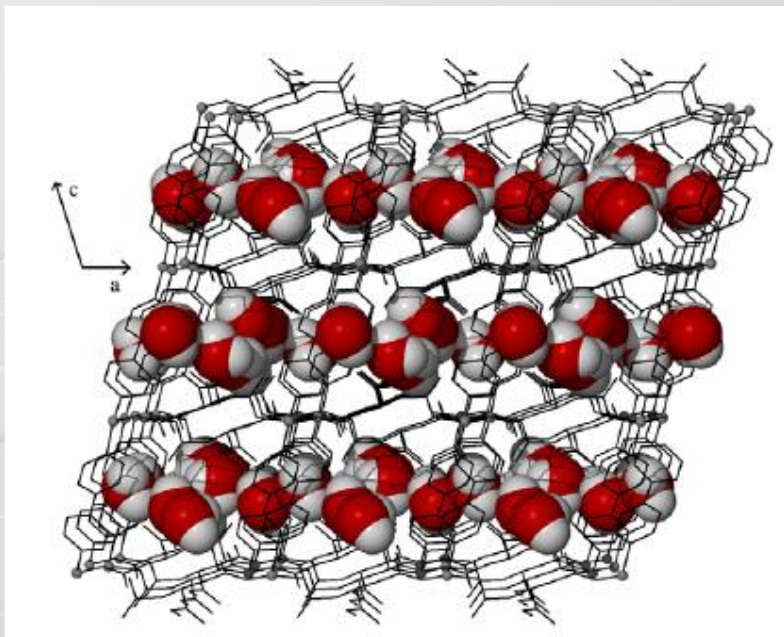




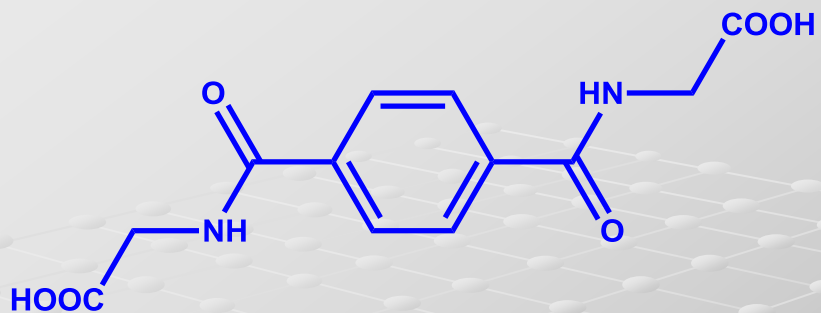




# Addition of Lewis bases in metal ion – polycarboxylate reaction mixtures



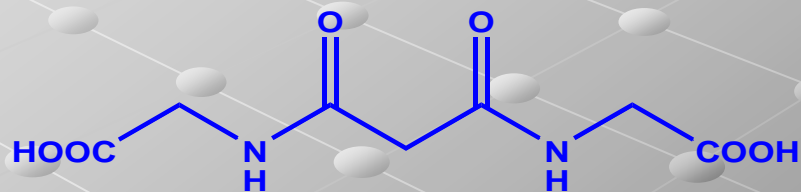
## b. Pseudopeptides



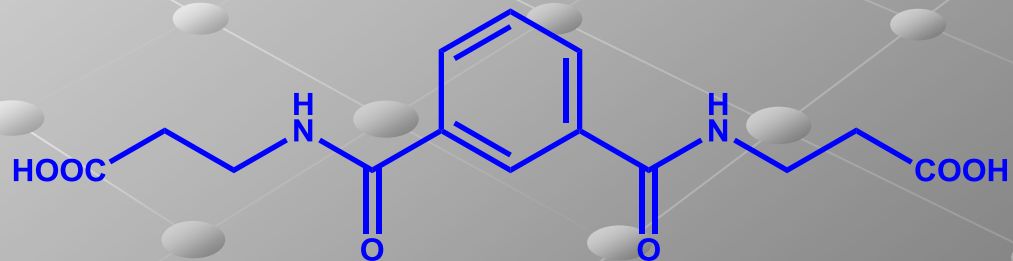
*TBGH<sub>2</sub>*



*OBGH<sub>2</sub>*



*MBGH<sub>2</sub>*



*IBβAH<sub>2</sub>*

# TBG<sup>2-</sup>

Co<sup>2+</sup>

Cu<sup>2+</sup>

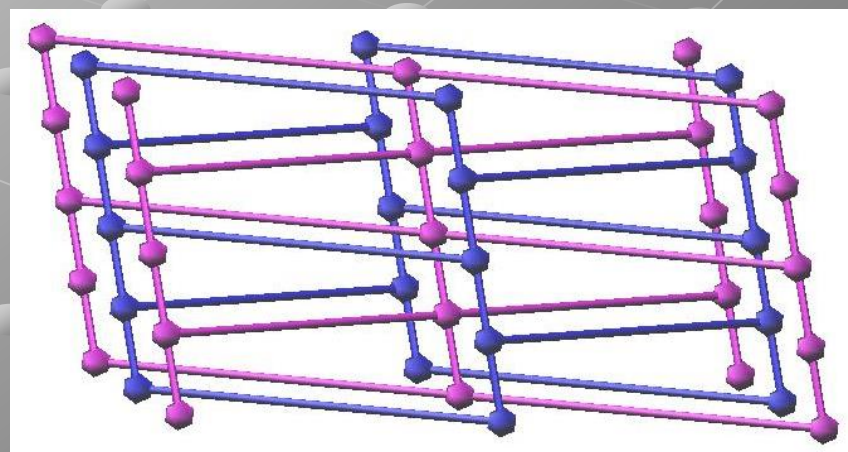
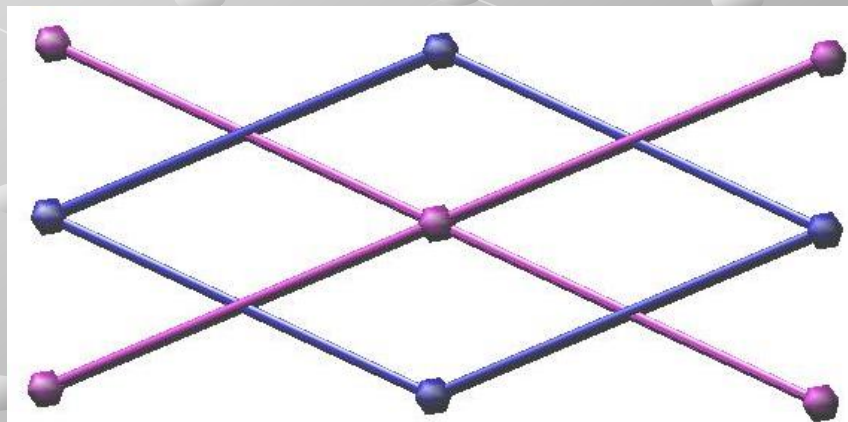
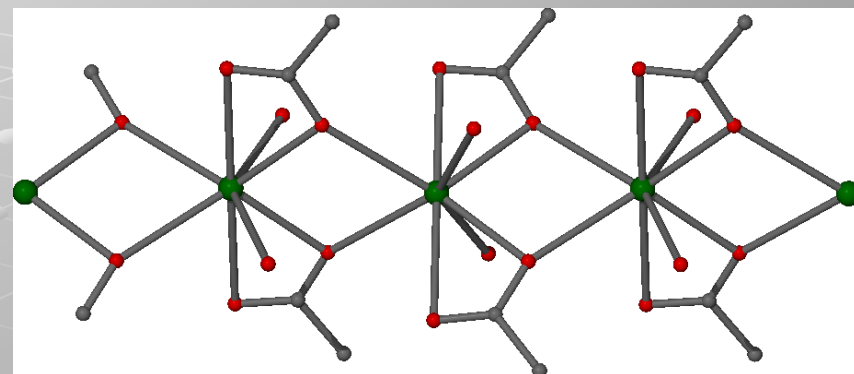
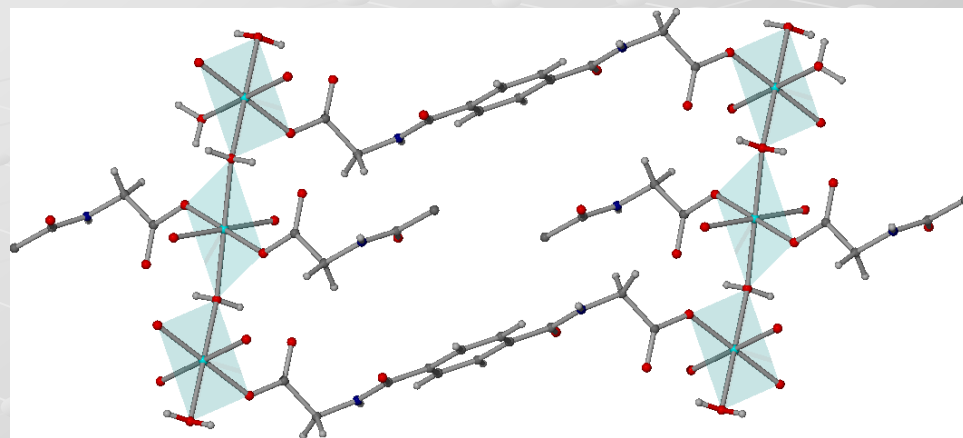
Pb<sup>2+</sup>

**Interpenetrated 3D polymers,**

**Hexadentate  $\mu_4$  - carboxylate**

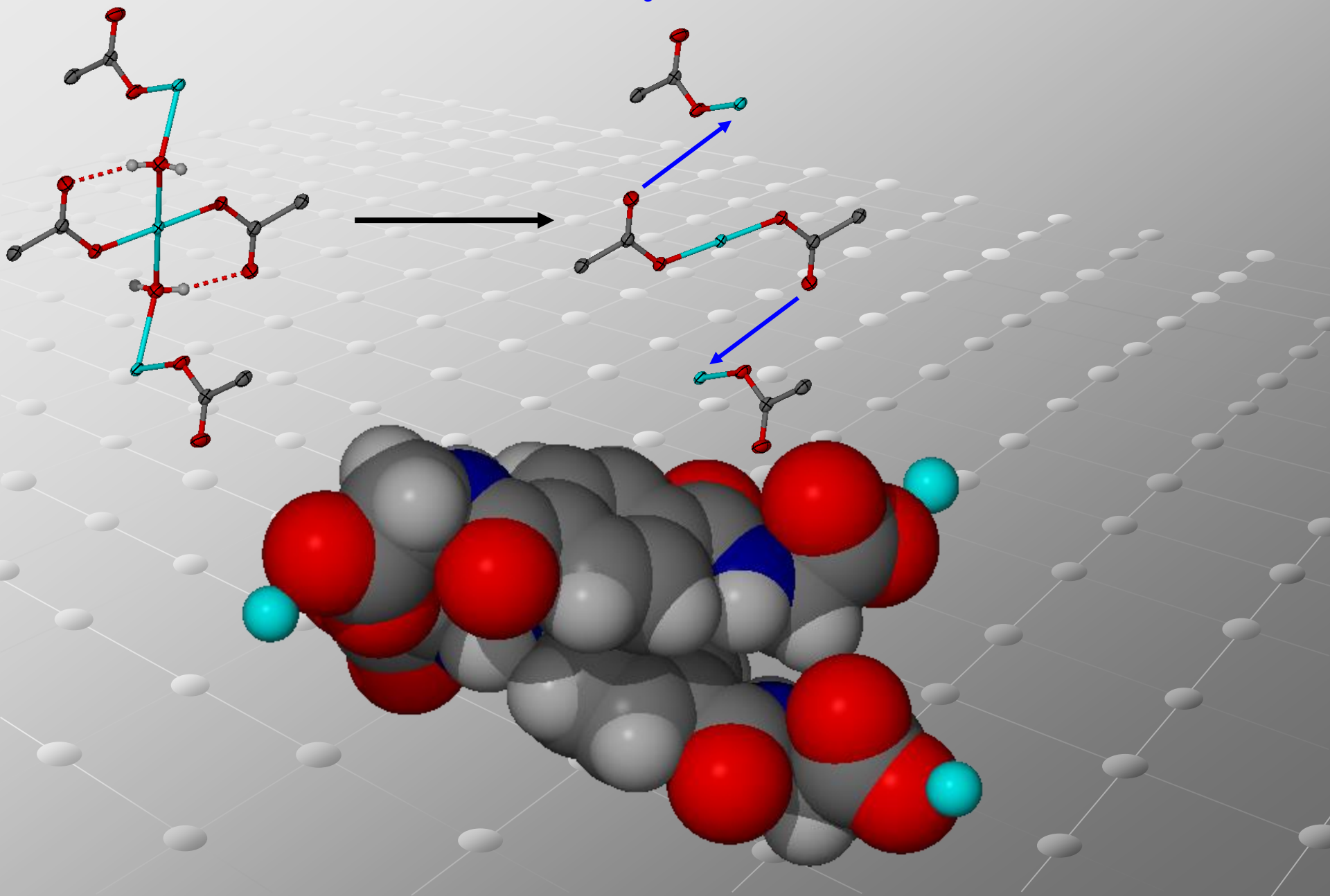
$\mu_2$  - carboxylate

$\mu_2$  - carboxylate

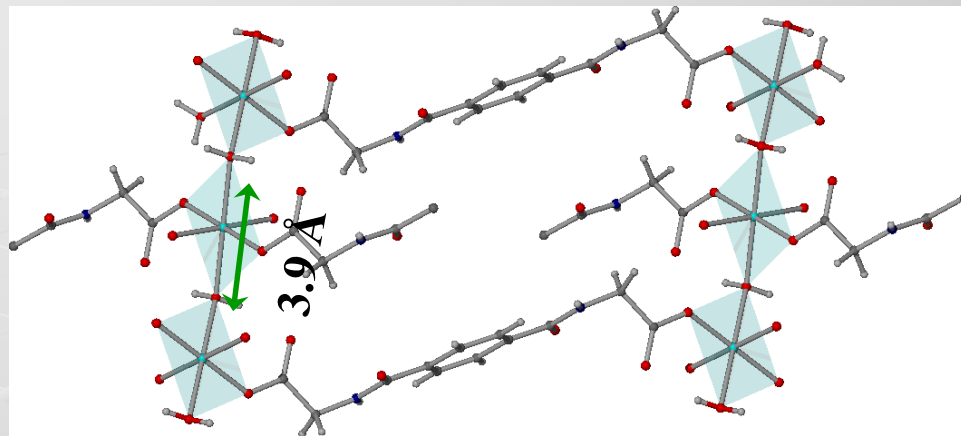


**Topological type: cds, 4 – connected {6<sup>5</sup>;8}**

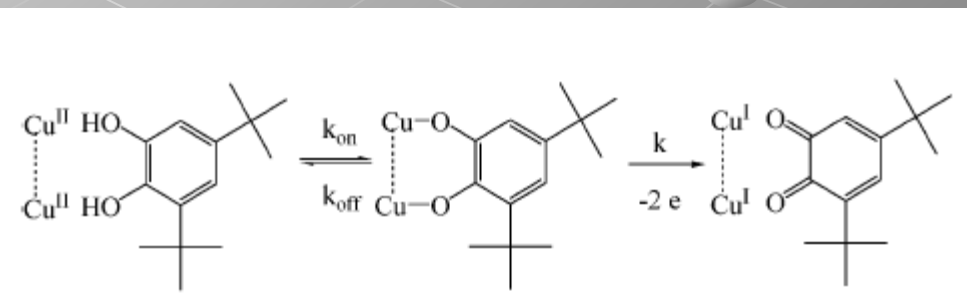
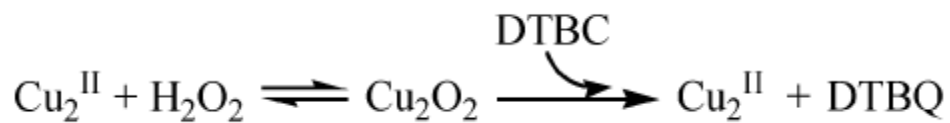
## Reversibility of water loss



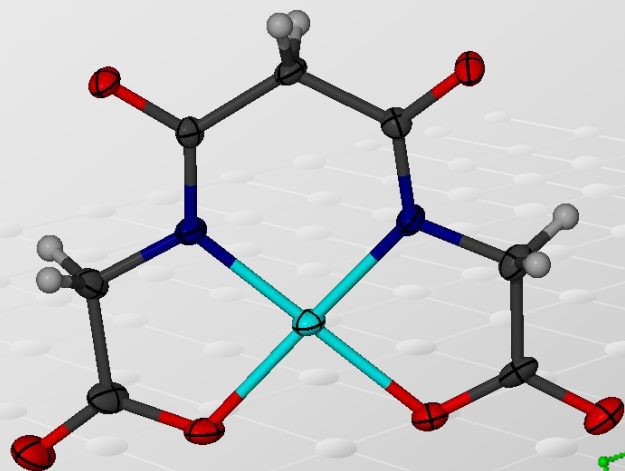
# Catalytic Properties of the $\text{Cu}^{\text{II}}$ -TBG<sup>2-</sup> polymer



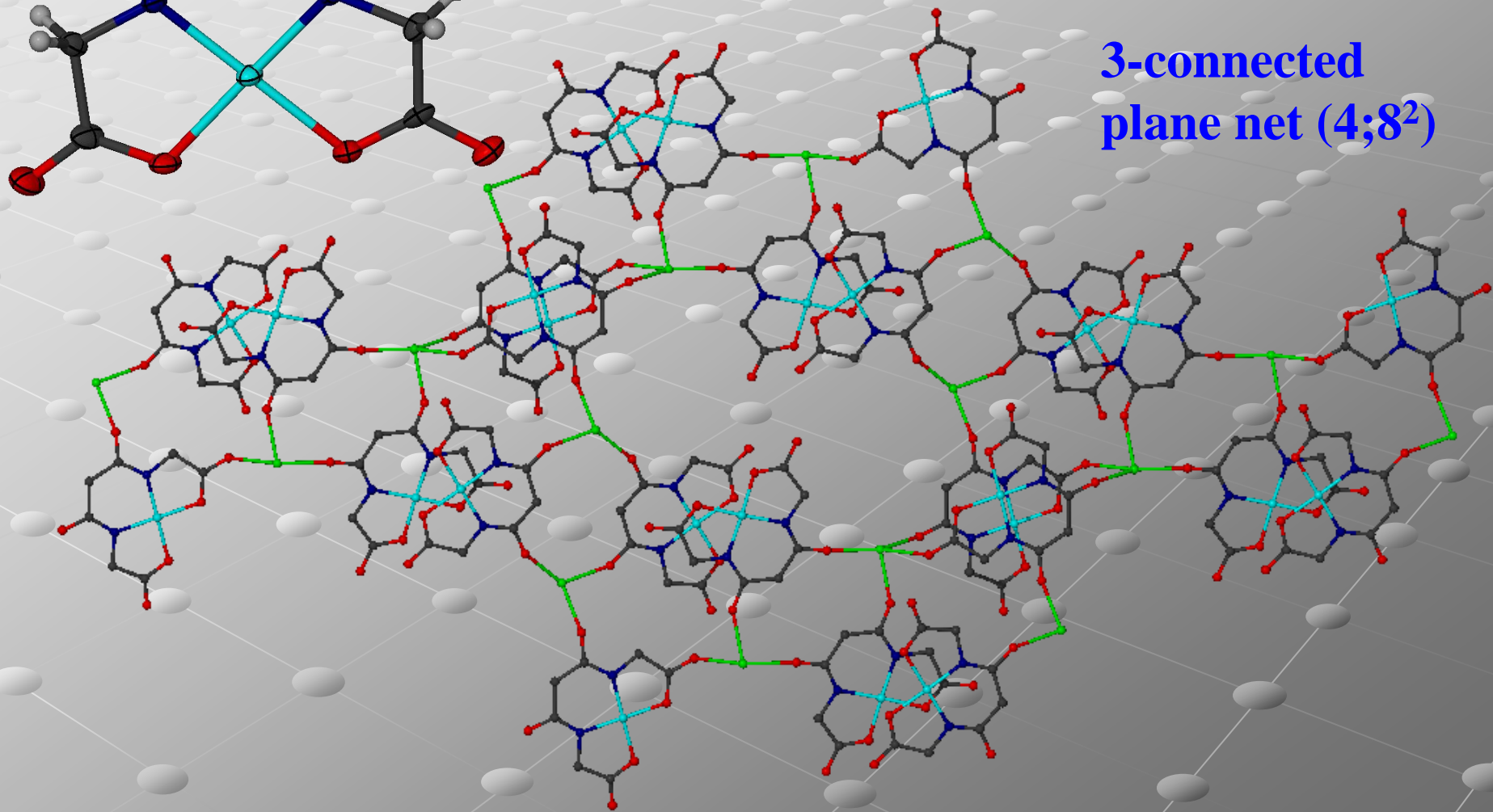
Resembles tyrosinase active site and catalyses the oxidation of DTBC heterogeneously, in the presence of  $\text{H}_2\text{O}_2$



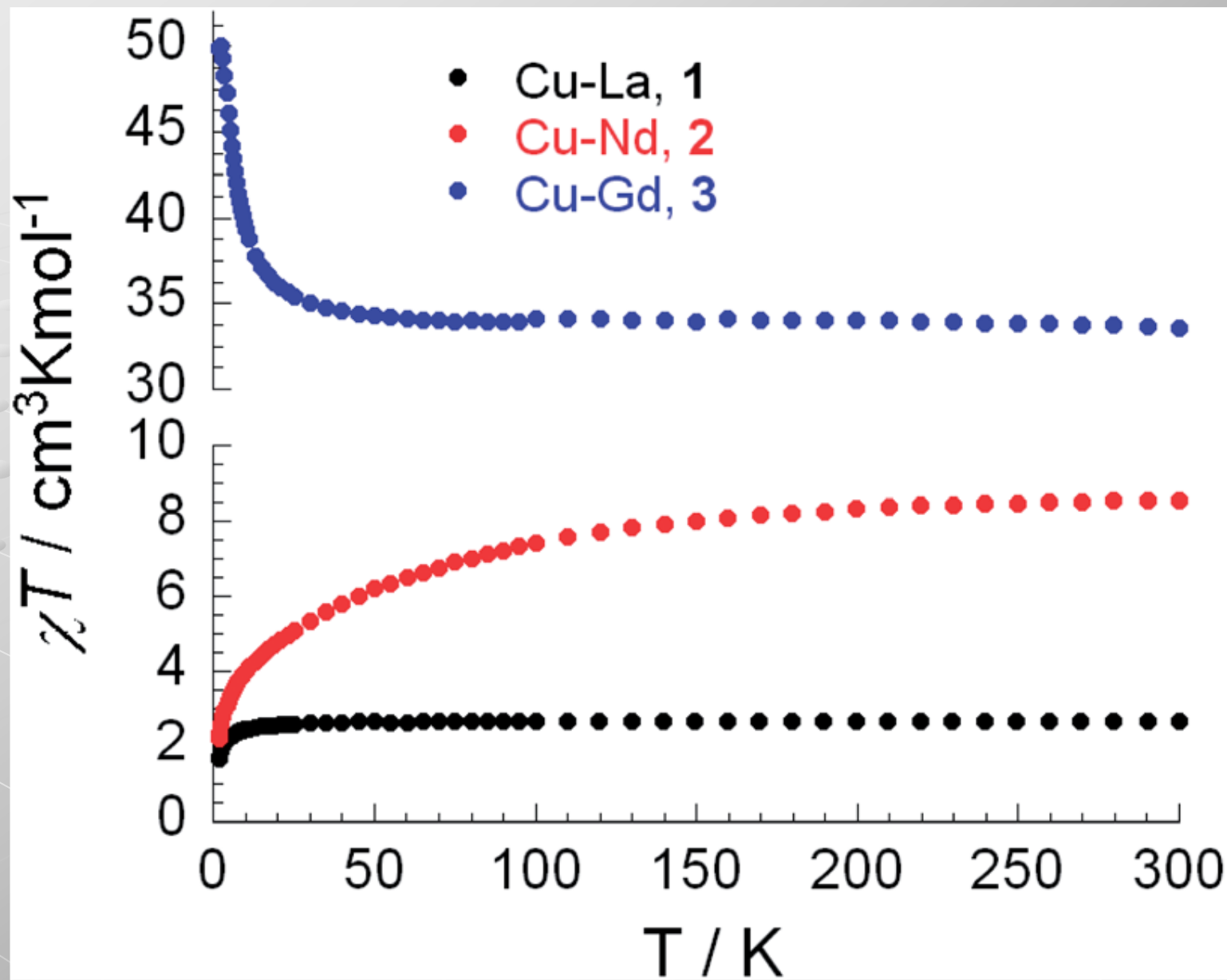
# Malonylbisglycinate, MBG<sup>2-</sup>



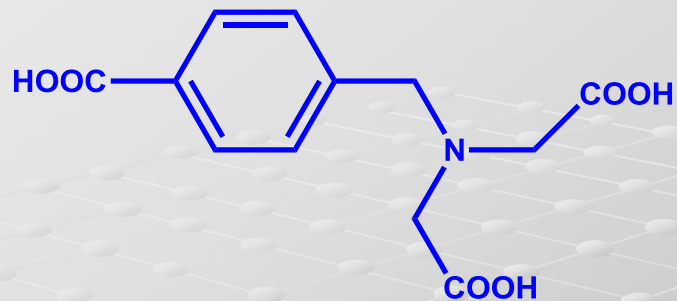
**3-connected  
plane net (4;8<sup>2</sup>)**







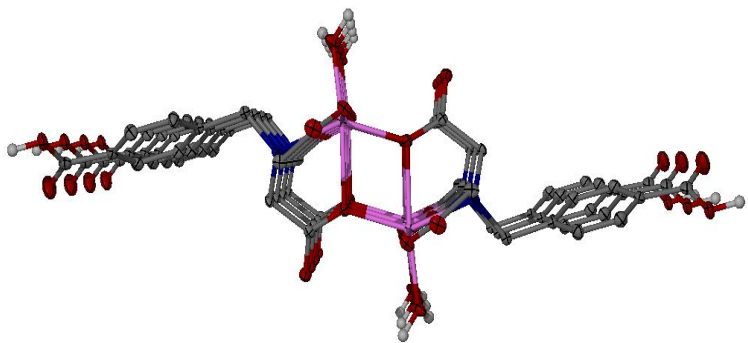
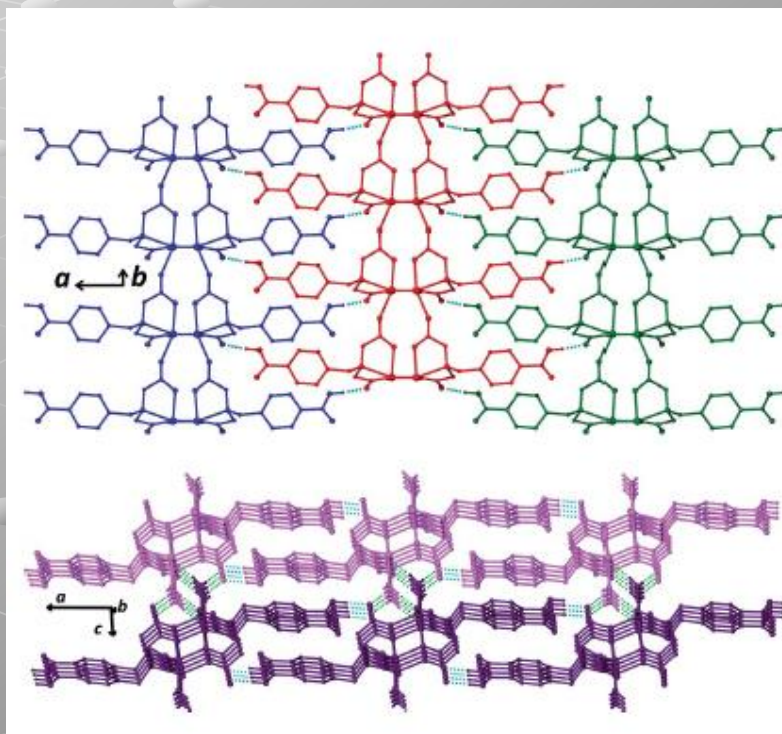
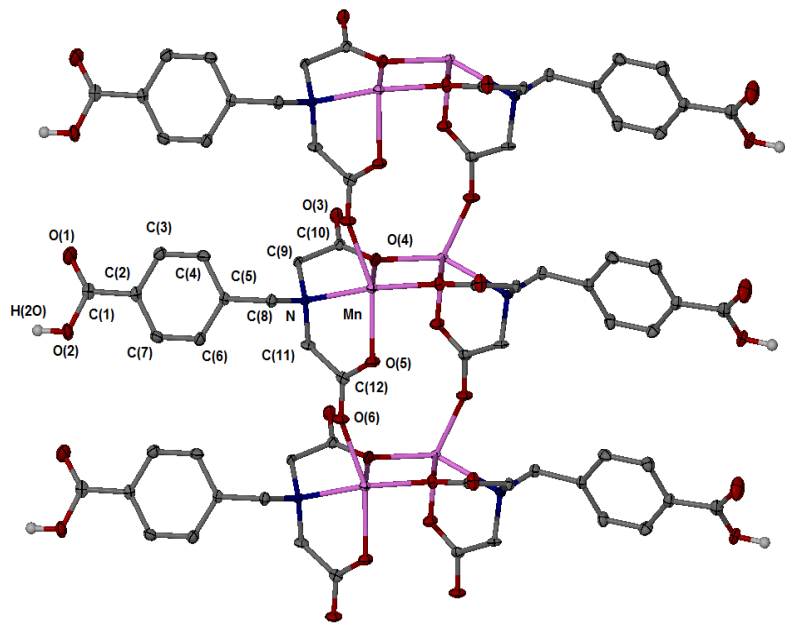
## c. Iminodiacetates



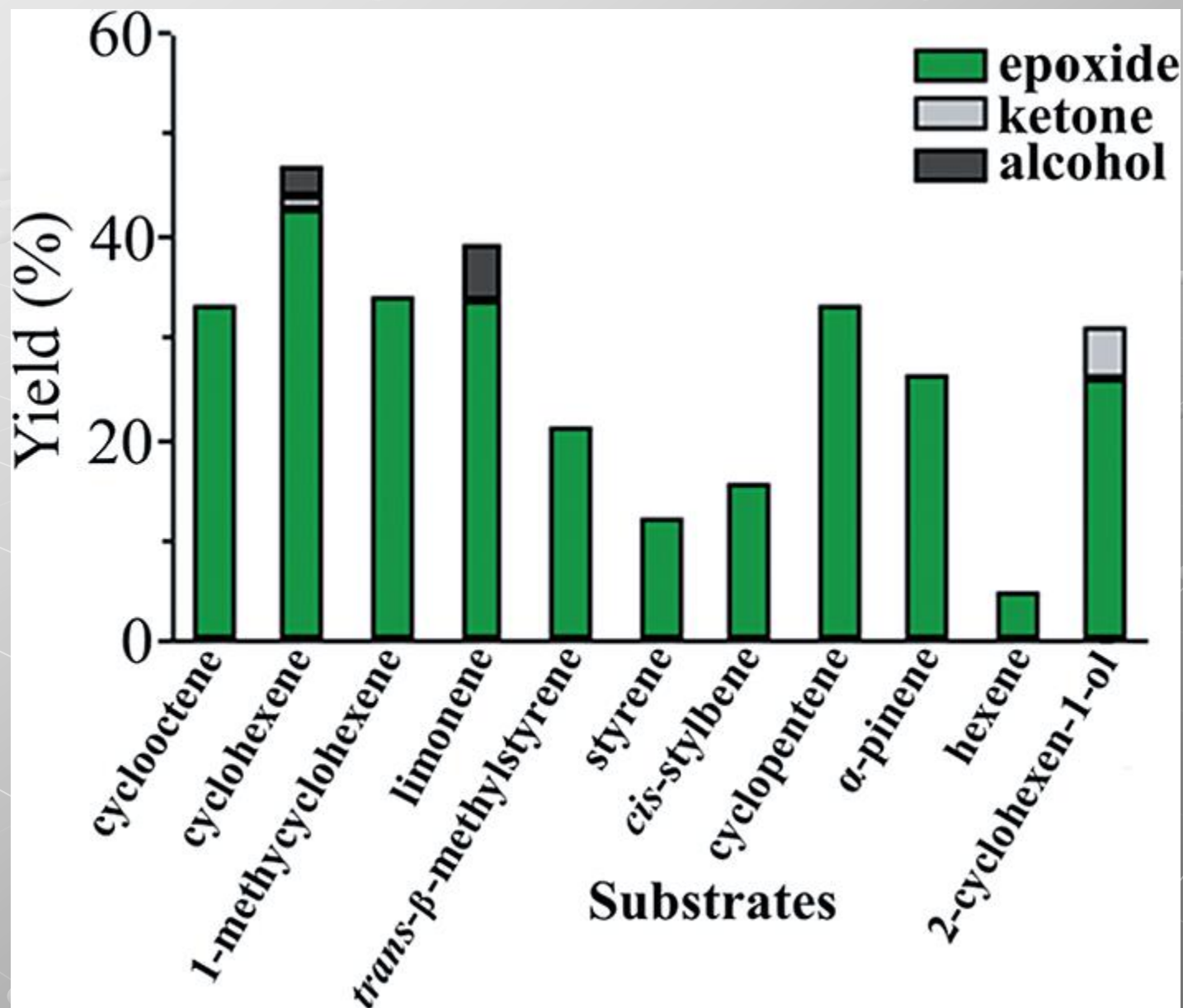
*N-(4-carboxybenzyl)iminodiacetic acid*

**Unprecedented coordinating behavior**  
**Four different protonation states with ten different coordination modes**

# 1D Polymers



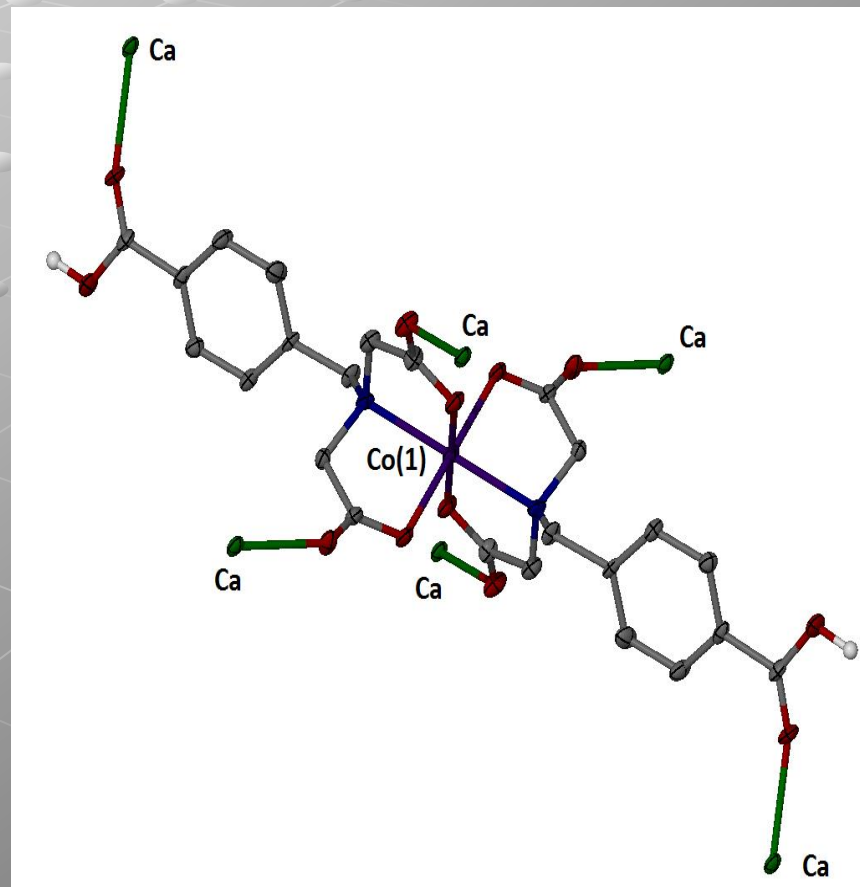
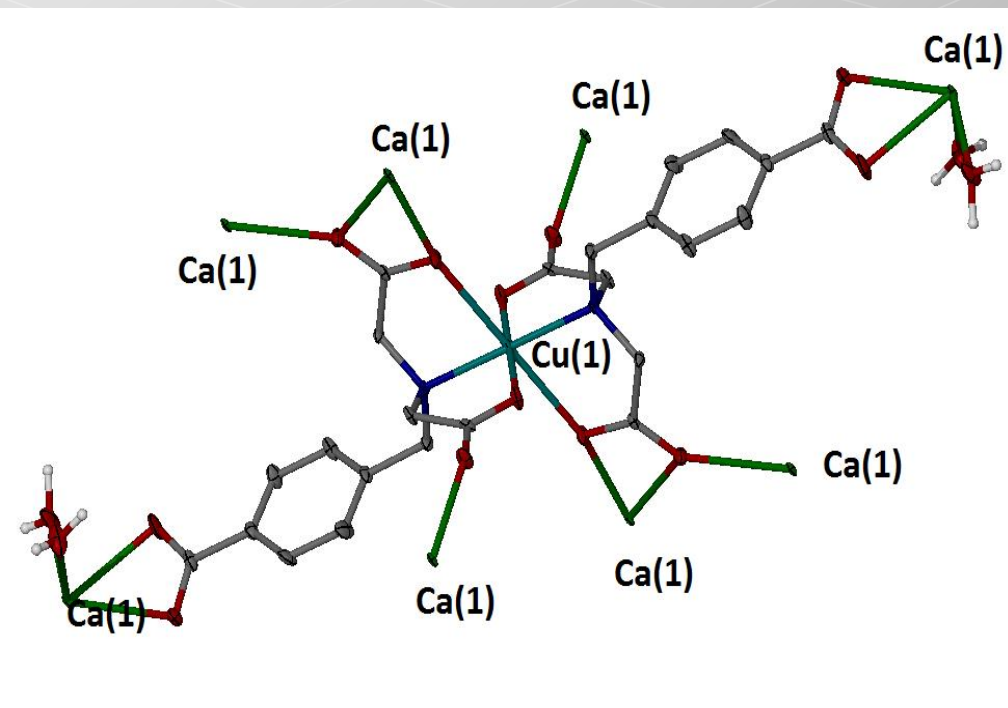
## Heterogeneous Oxidation Catalysts

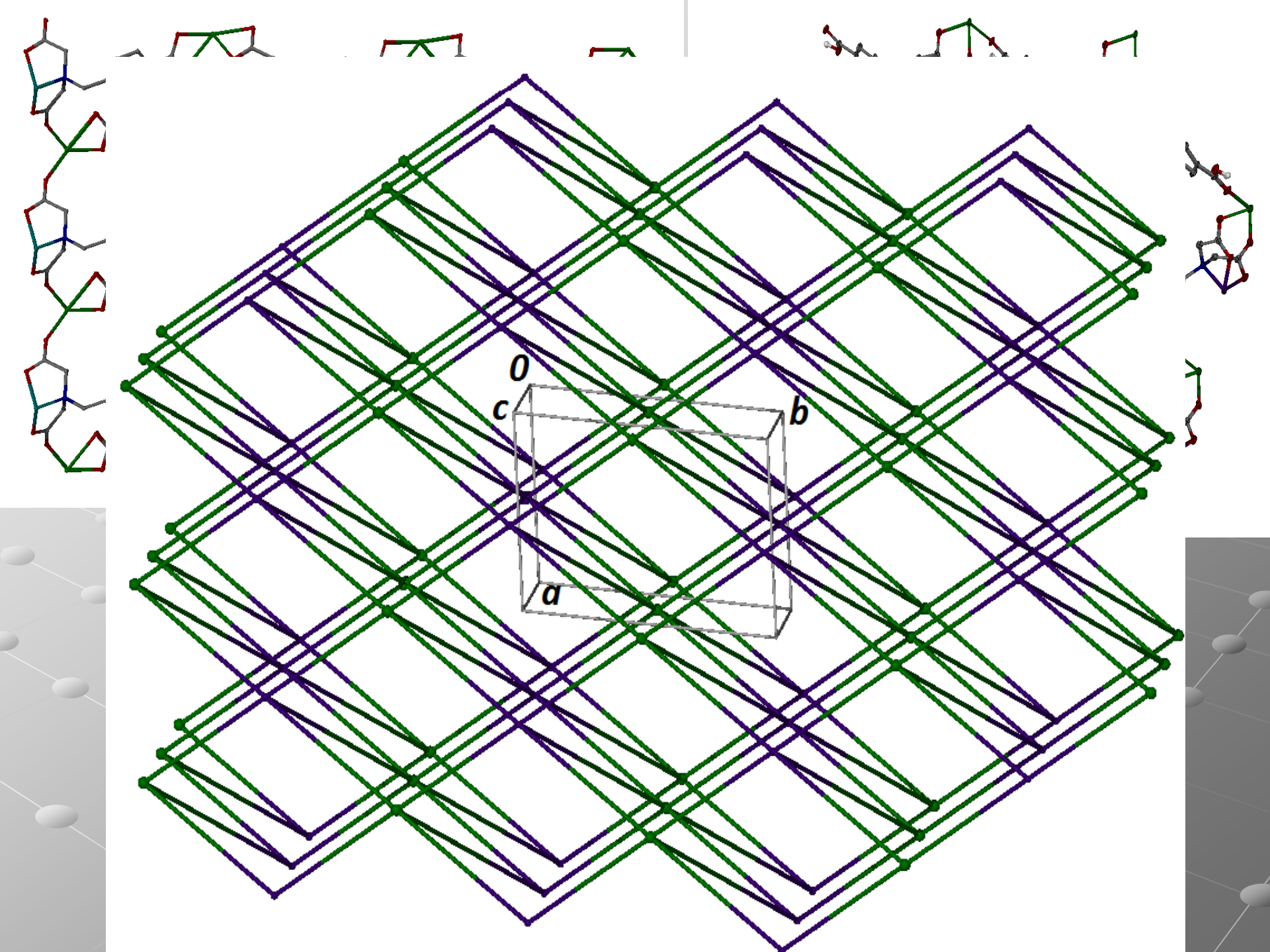


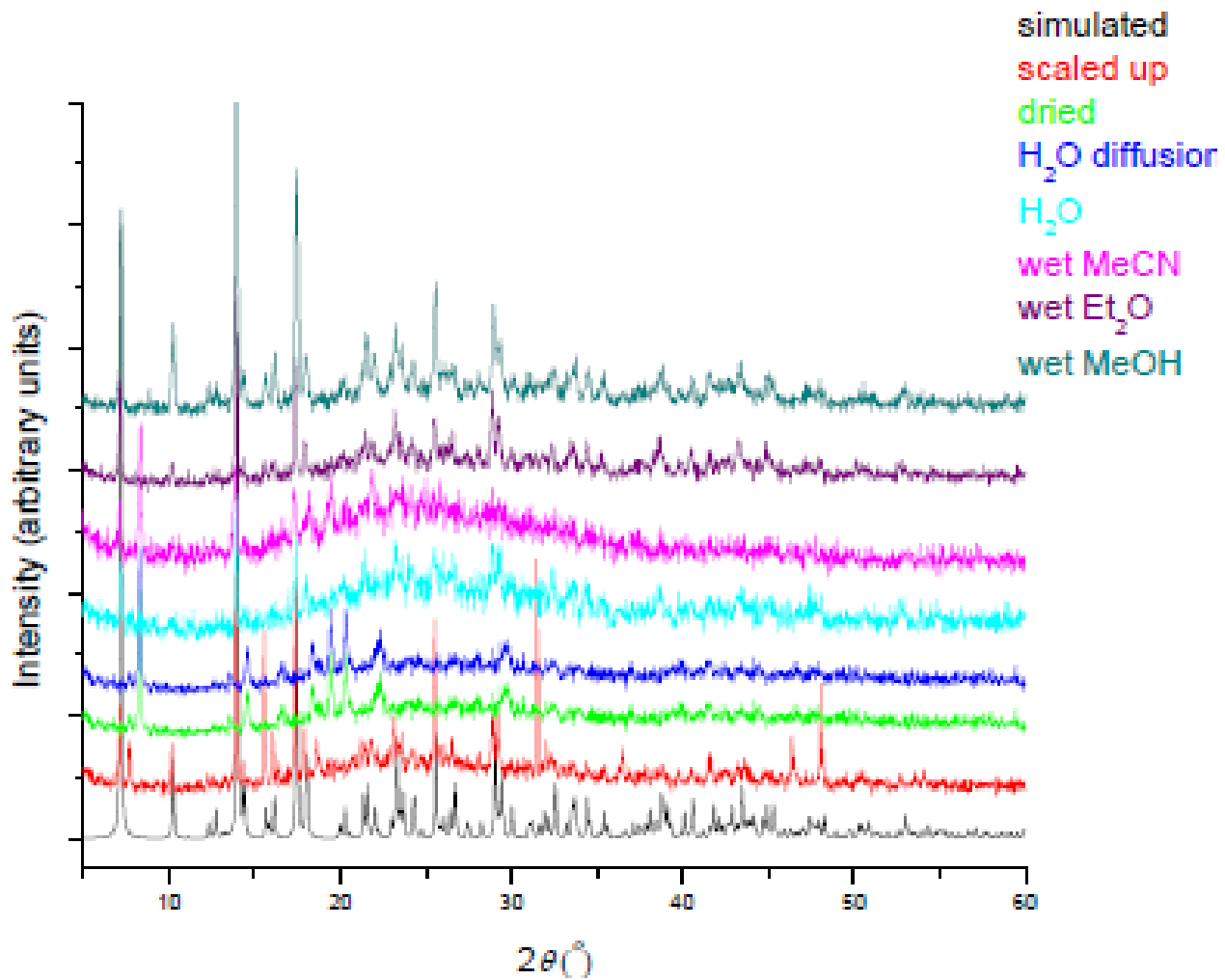
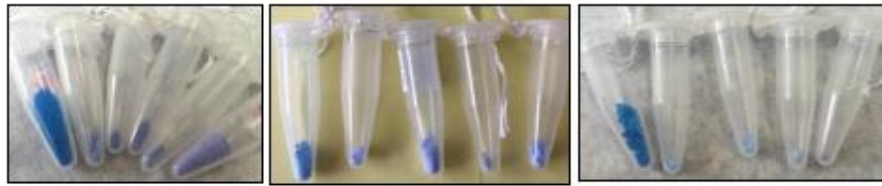
# 3D Mixed Metal Polymers



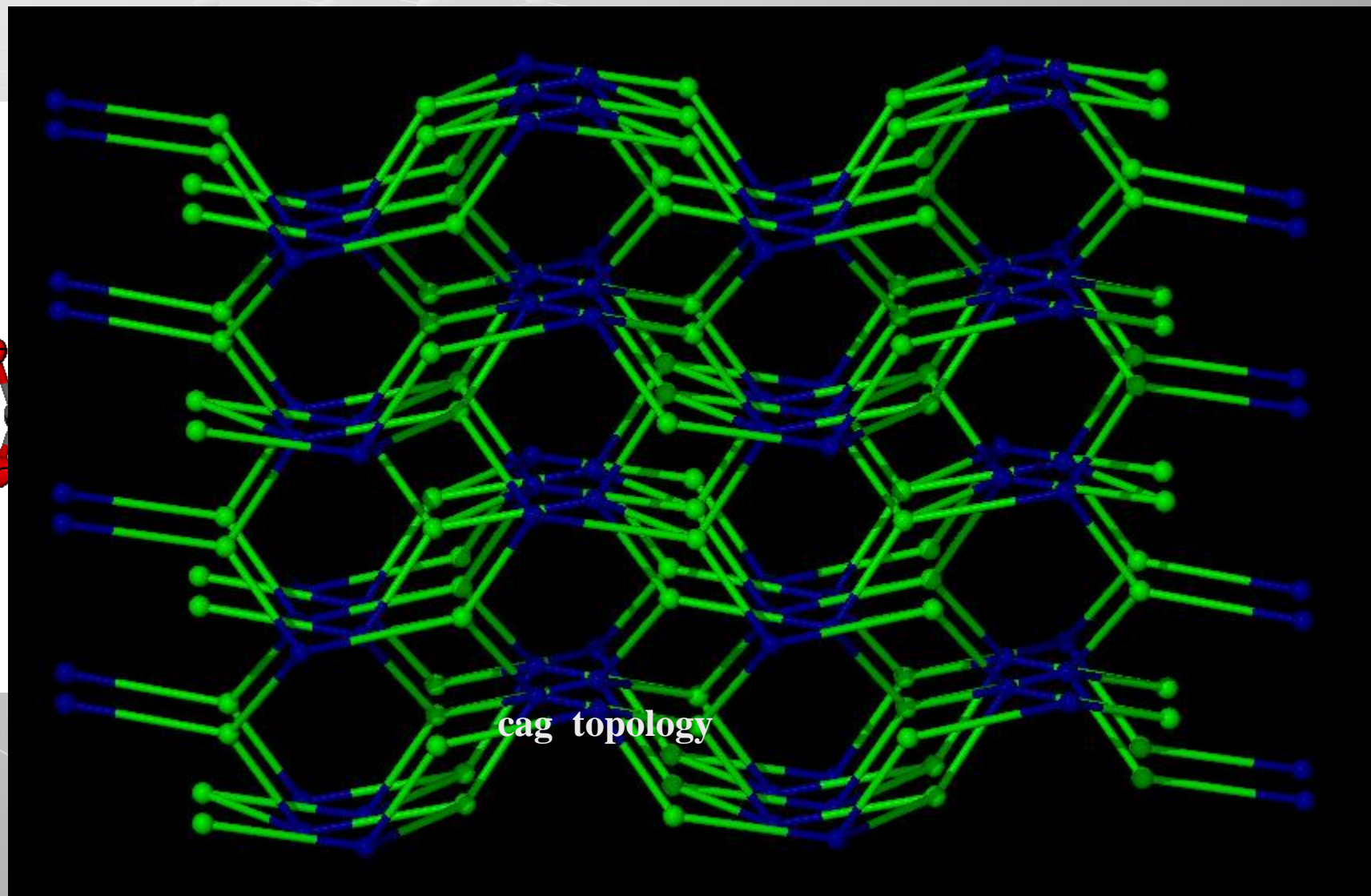
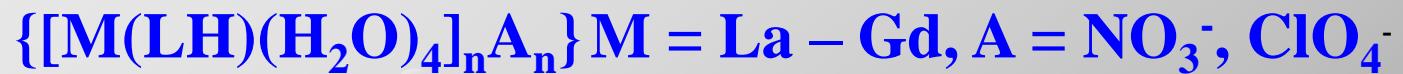
M = Ca, Sr, Ba



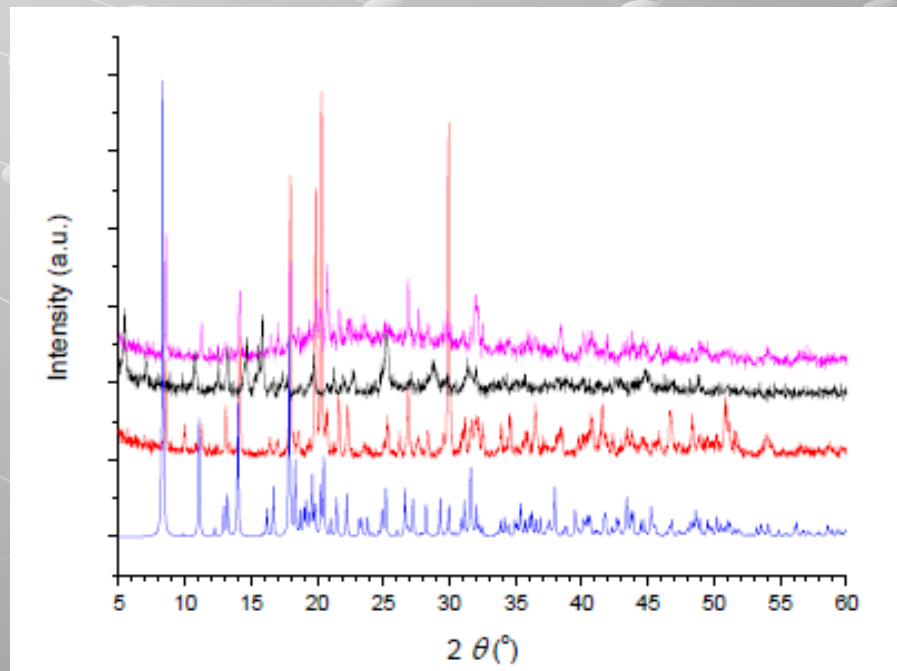
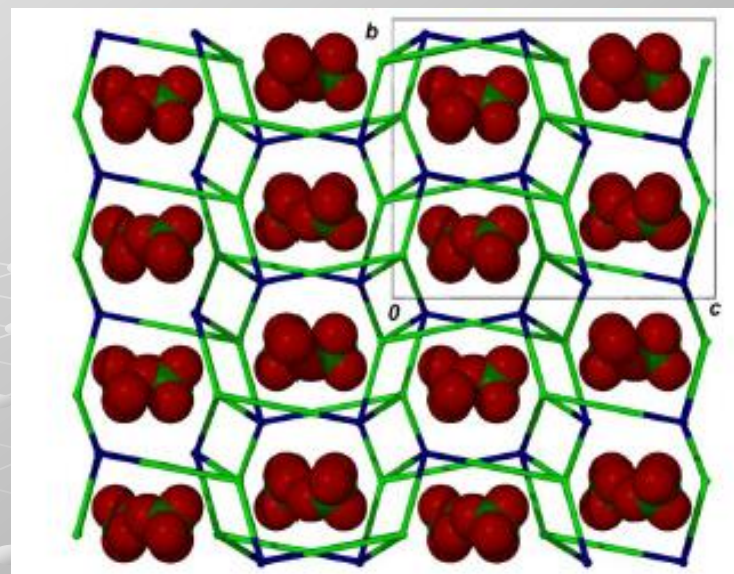
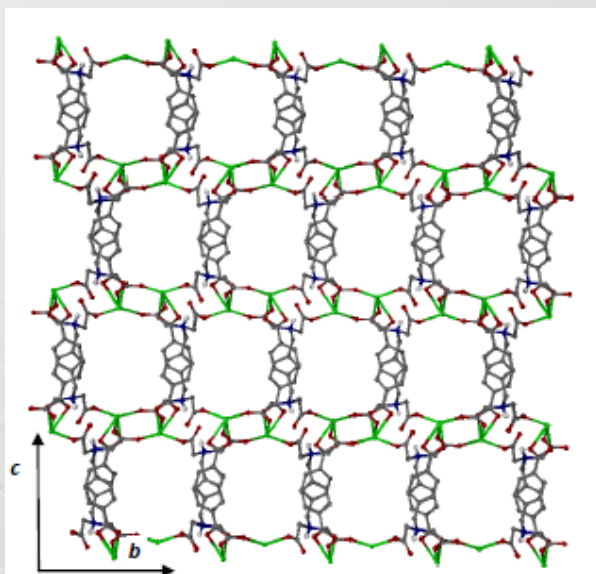




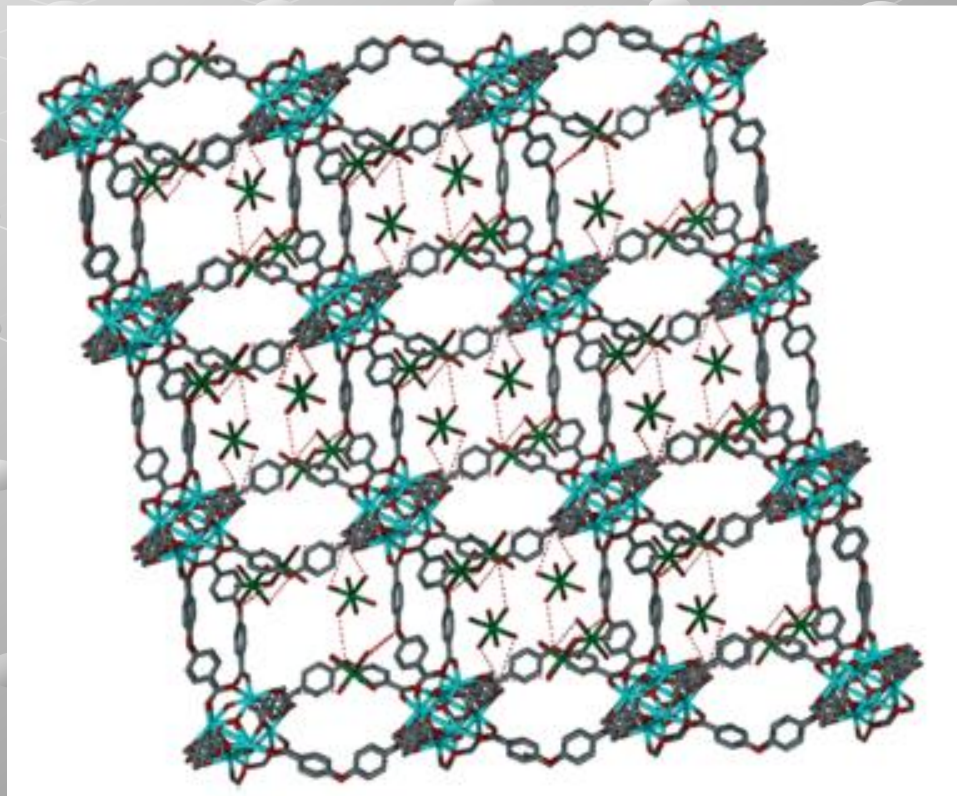
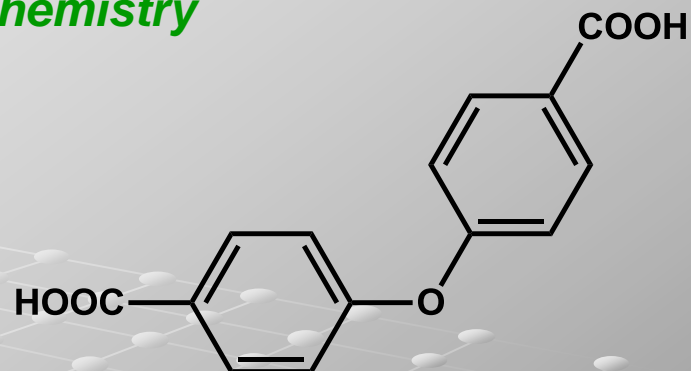
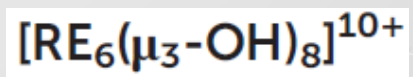
# 3D Cationic Polymers



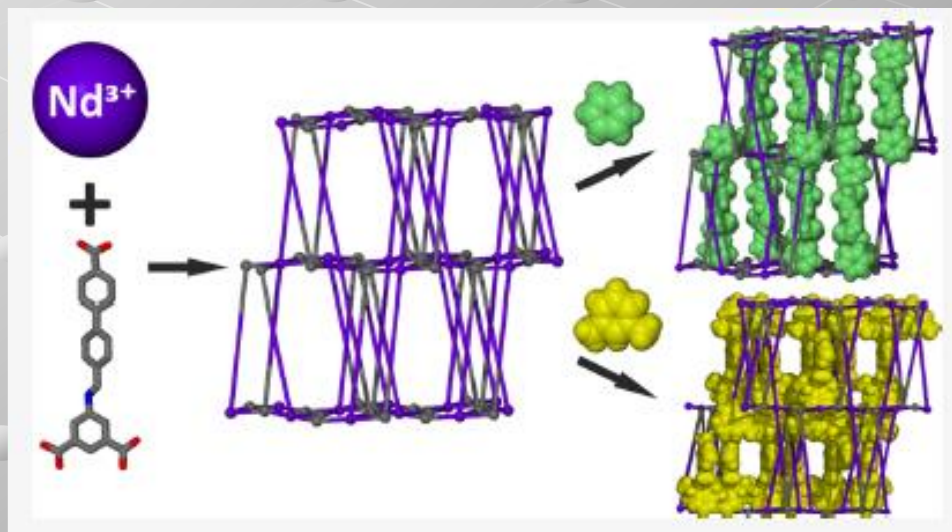
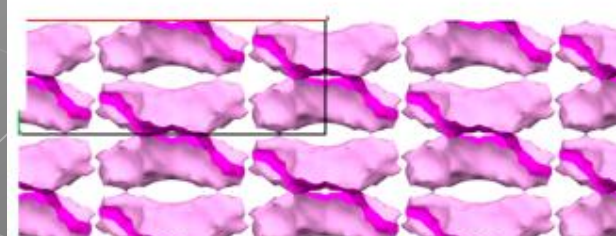
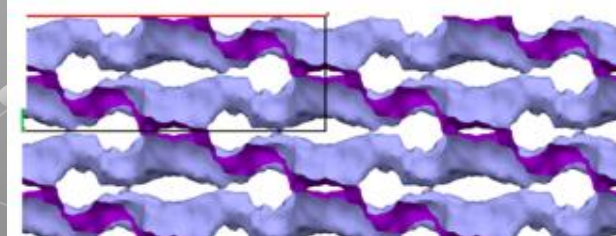
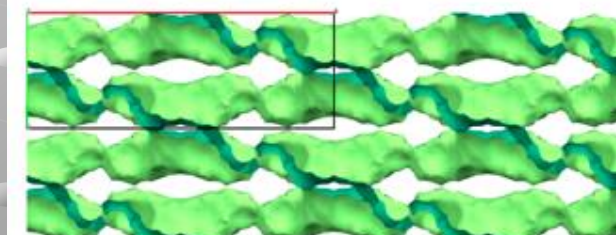
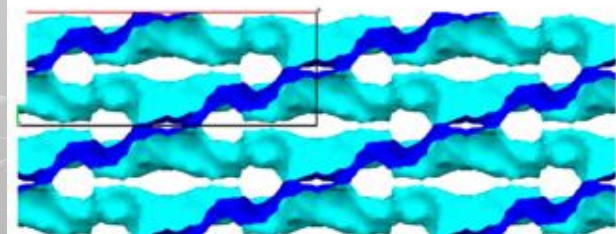
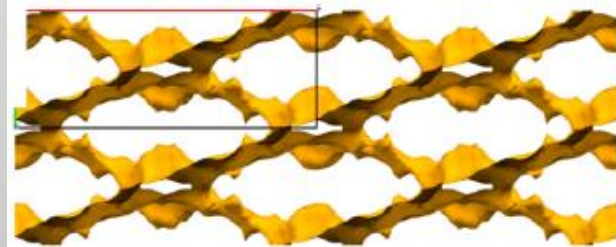
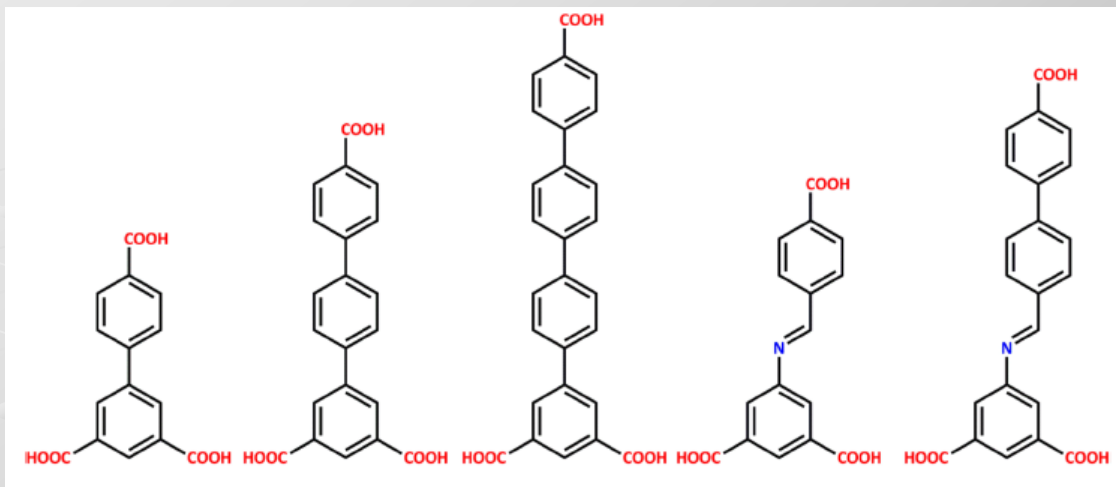


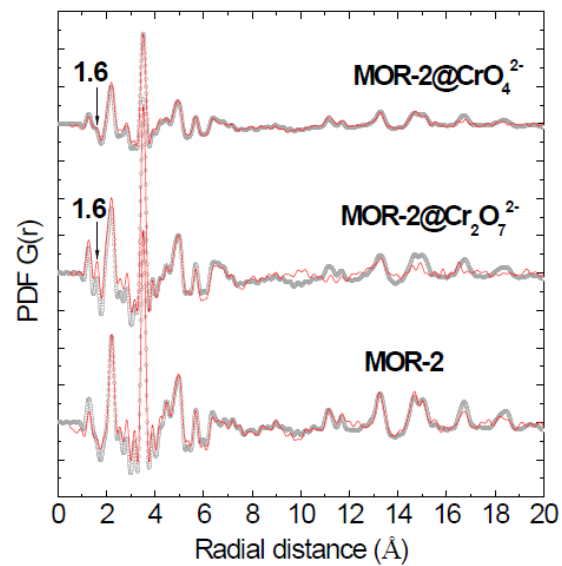
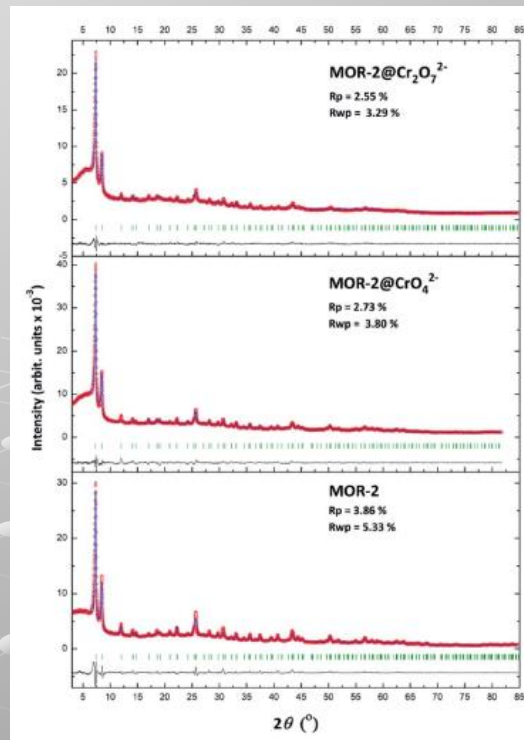
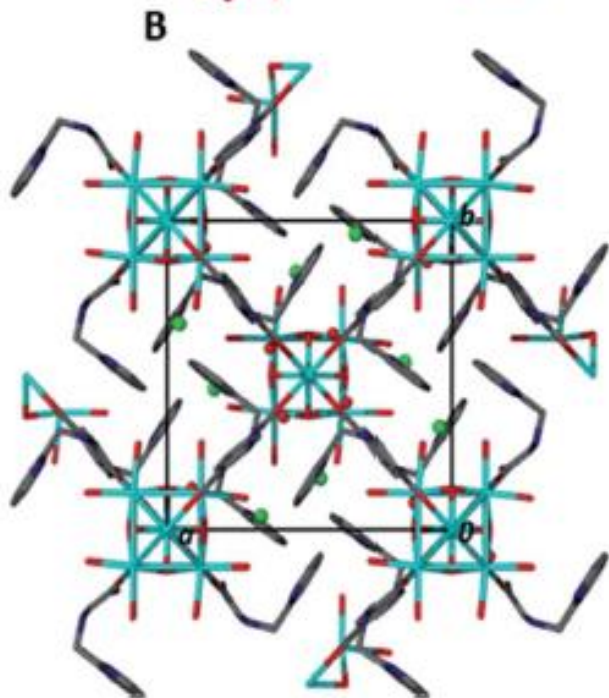
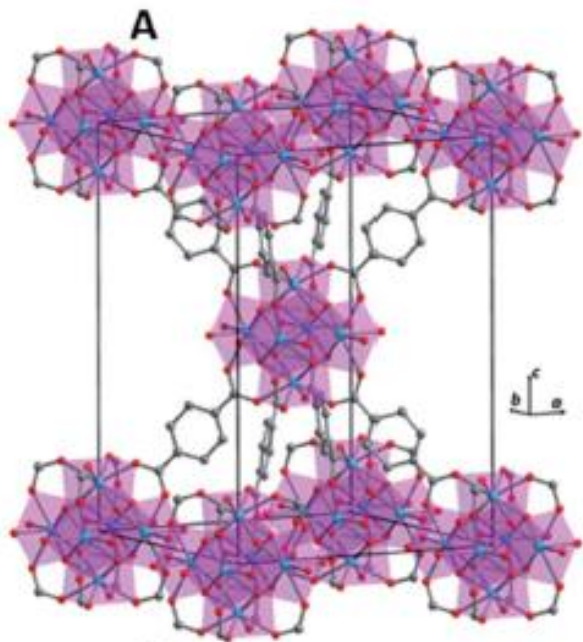


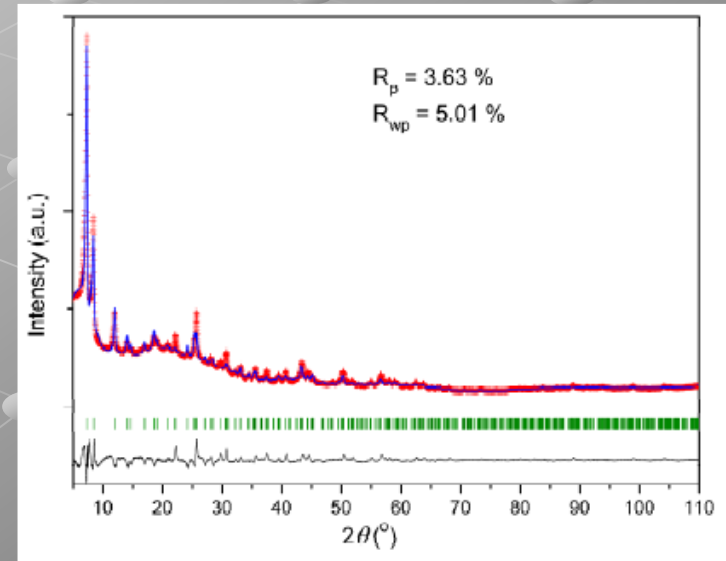
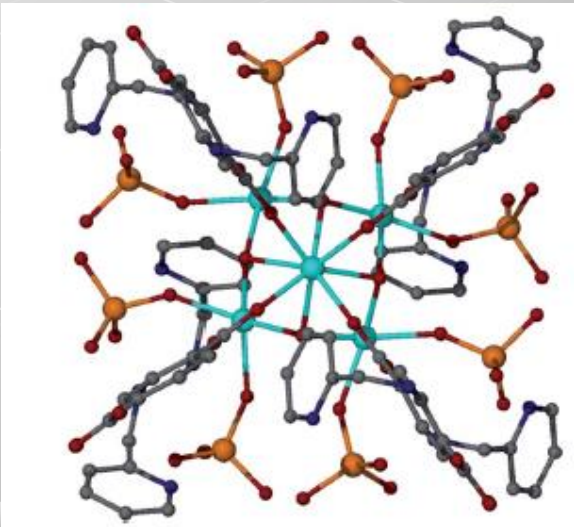
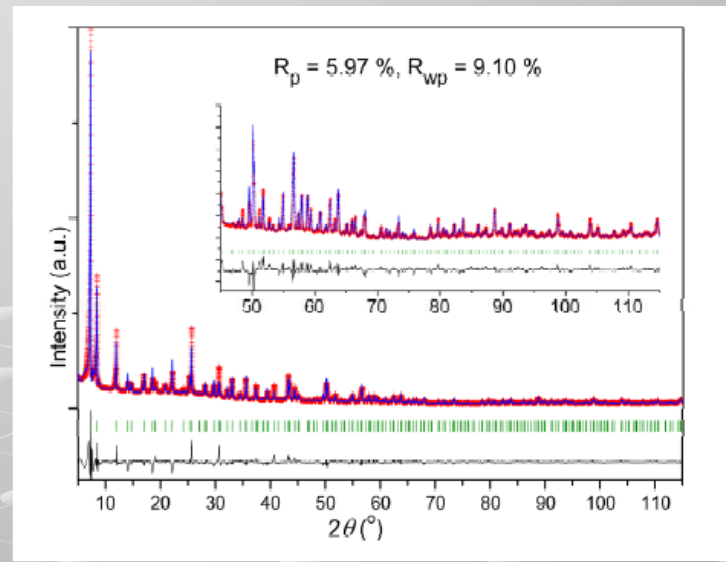
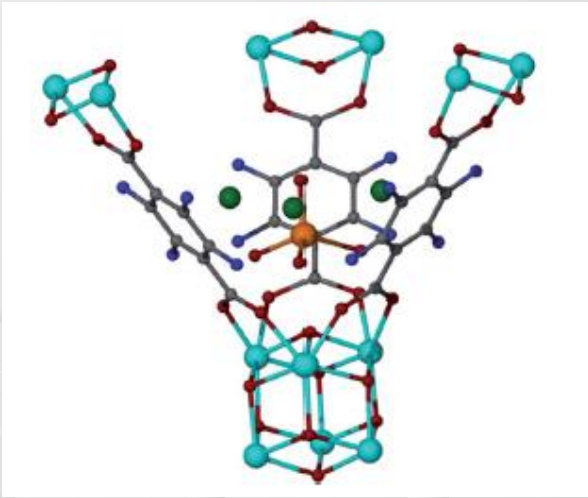
## OBA Chemistry



# Isorecticular synthesis and SCSC transformations







# COLLAGUES

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**Dr. Vasilis Psycharis**

**Dr. Athanassios Boudalis**

**Prof. Costas Milios**

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Ευρωπαϊκό Κοινωνικό Ταμείο



ΕΠΙΧΕΙΡΗΣΙΑΚΟ ΠΡΟΓΡΑΜΜΑ  
ΕΚΠΑΙΔΕΥΣΗ ΚΑΙ ΔΙΑ ΒΙΟΥ ΜΑΘΗΣΗ  
*επένδυση στην κοινωνία της γνώσης*

ΥΠΟΥΡΓΕΙΟ ΠΑΙΔΕΙΑΣ ΚΑΙ ΘΡΗΣΚΕΥΜΑΤΩΝ  
ΕΙΔΙΚΗ ΥΠΗΡΕΣΙΑ ΔΙΑΧΕΙΡΙΣΗΣ

Με τη συγχρηματοδότηση της Ελλάδας και της Ευρωπαϊκής Ένωσης

