ReadCrystal

MicroED Service

Determining the structure of small molecules, MOFs, COFs, zeolites, inorganic compounds, minerals, and other similar substances.

ReadCrystal Biotechnology

About ReadCrystal Biotechnology

ReadCrystal Biotechnology is a leading Contract Research Organization (CRO) specialized in providing comprehensive structure solutions for a wide range of samples, including pharmaceutical compounds, new materials and proteins. Since our establishment in 2021, we have experienced remarkable growth, expanding into a dynamic team of over 50 highly skilled experts, operating within a spacious 1500 square meter laboratory.

We have created our own state-of-the-art electron microscope lab, equipped with specialized hardware and software tailored for MicroED applications. We have successfully served over 150 satisfied customers to date. We aim to bring the latest advancements in structure determination technology to solve problems for customers.

Founders of the company

Junliang Sun, PhD

Scientific founder

Professor at the College of Chemistry and Molecular Engineering, Peking University, China

MicroED Expert

Xiaoguang Lei, PhD

Scientific founder

Professor at the College of Chemistry and Molecular Engineering, Peking University, China

Chemist

Leifeng Liu, PhD

Chief Executive Officer

PhD from Stockholm University, Sweden

MicroED Expert

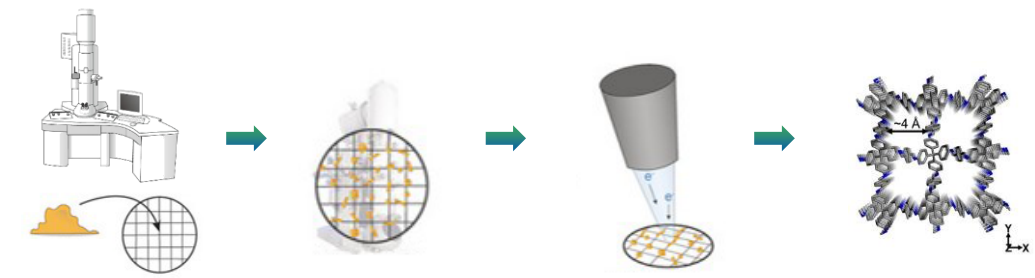
MicroED for Nano-sized Crystals

MicroED is an emerging technique used to analyze the atomic structures of nano-sized crystals. While similar in principle to X-ray diffraction, MicroED utilizes high-energy electrons as the incident beam, resulting in more profound interactions with crystals. As a result, complete data can be obtained even from crystals of nano size.

Why choose MicroED?

- ✓ Crystal size 100 nm required
- ✓ Sample consumption 1mg required
- ✓ Samples of mixed phases
- ✓ High resolution: 2.5Å for proteins, <1.0 Å for small molecules

MicroED Workflow



Sample Preparation → Sample Test → Electron Diffraction Data Collection → Data Analysis

Applications

- ✓ Structure determination
- ✓ Absolute structure determination
- ✓ Polymorphism identification from finished dosage form

Applicable Samples

- ✓ Pharmaceutical compound crystals
- ✓ Porous materials: MOF, COF, Zeolite
- ✓ Inorganic crystals
- ✓ Minerals

MicroED service from ReadCrystal

Why to choose ReadCrystal Biotechnology?

Facility: MicroED Platform with optimized configuration and controlling software

Personnel: Pioneering experts in MicroED technology since 2007

Reliability: Serviced more than 150 industry and research institute within three years

Competitive Pricing: Our goal is to make MicroED accessible to every scientist

Case study 1: Pharmaceutical Compounds

Oseltamivir phosphate is an oral anti-viral drug approved for the treatment of acute, uncomplicated influenza. It is difficult to culture single crystals with appropriate size for X-ray diffraction. We unlocked the API's structure in powders in 2 working days.

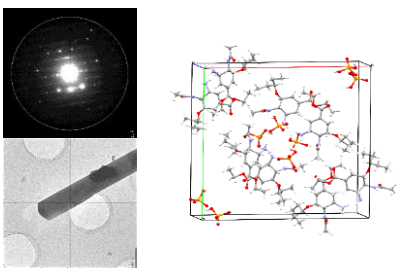


Figure 1. TEM images (left, top) and 3D electron diffraction (left, bottom) and structure (right) of Oseltamivir phosphate

Identification code	Oseltamivir Phosphate
Empirical formula	$C_{16}H_{31}N_2O_8P$
Formula weight	410.40
Space group	$P2_12_12$
a=23.4 Å, b=23.6 Å, c=7.2 Å, α=β=γ=90°	
Final R indexes [I>=2σ (I)]	R1 = 0.1987, wR2 = 0.4698

Table 1. Crystal data for Oseltamivir phosphate

Case study 2: Metal Organic Framework (MOF)

Ni(DMBD)-MOF, with 200 nm crystals, was specially designed and synthesized for efficient electrocatalytic oxygen evolution reaction (OER). ReadCrystal provided the structure analysis using MicroED within 4 working days.

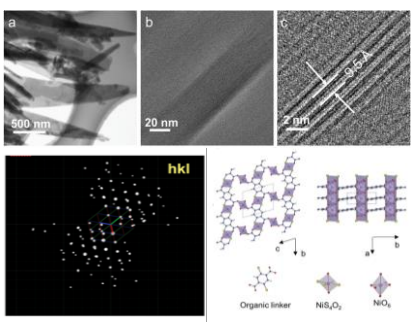


Figure 2. TEM images and 3D electron diffraction and structure of Ni(DMBD)-MOF nanosheet.

Identification code	Ni(DMBD)-MOF
Empirical formula	$Ni_2(C_8H_2O_4S_2)\bullet 2H_2O$
Formula weight	375.62
Space group	P-1
a=3.3 Å, b=8.2 Å, c=9.8 Å,	α=73.8°, β=81.8°, γ=88.2°
Final R indexes [I>=2σ (I)]	R1 = 0.2716, wR2 = 0.5410

Table 2. Crystal data for Ni(DMBD)-MOF

https://onlinelibrary.wiley.com/doi/full/10.1002/adma.202300945

Case study 3: Covalent Organic Framework (COF)

In this study, it was demonstrated for the first time that the hydrogen atoms of a COF, not only on the framework but also on the guest molecule, can be located by MicroED under cryogenic conditions. Hydrogen atoms can be revealed by kinematical and dynamical refinements.

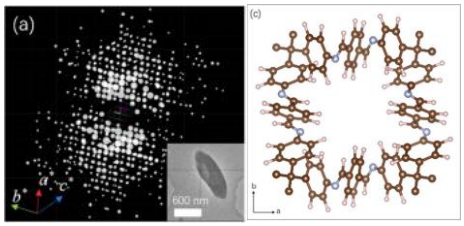


Figure 3. Structure of COF-300-V

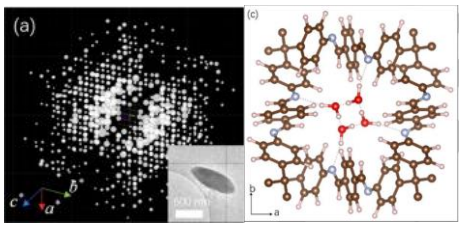


Figure 4. Structure of COF-300-H_2O

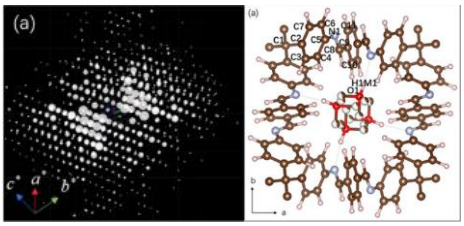


Figure 5. Structure of COF-300-CH_3OH

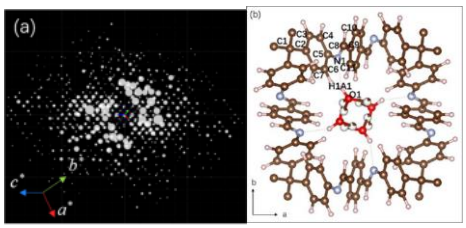


Figure 6. Structure of COF-300-C_2H_5OH

https://onlinelibrary.wiley.com/doi/abs/10.1002/ange.202305985

Case study 4: Coordination polymer crystal

This study developed a one-step method to create photoresponsive microcapsules using interfacial self-assembly of an azopyridine coordination polymer. The structure of the polymer was determined by ReadCrystal's MicroED platform, with crystals measuring 200-300 nm. Results were delivered within 3 days.

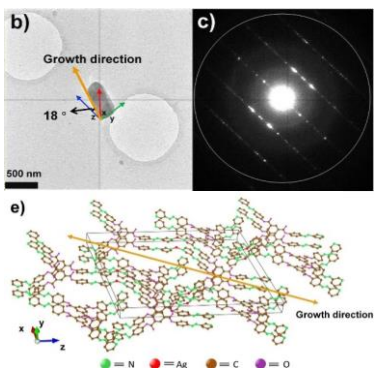


Figure 7. TEM images and 3D electron diffraction and structure of coordination polymer.

Empirical formula	$C_{42}H_{27}AgN_9O_6$
Formula weight	861.61
Space group	I2
a=29.1 Å, b=3.6 Å, c=39.5 Å, a=γ=90°, β=102.8°	
Final R indexes [I>=2σ (I)]	R1 = 0.2994, wR2 = 0.5696

Table 3. Crystal data for coordination polymer

https://www.sciencedirect.com/science/article/pii/S1385894723011348

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Workflow

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