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Chiral Detection with Fluorescent Coordination Polymers

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Chirality is an intrinsic property of life on Earth. Biological systems have evolved alongside chiral molecules like proteins, DNA, and sugars, which all exist as pairs of nonsuperimposable mirror images. These mirror images, called enantiomers, are chemically indistinguishable, except when they interact with other chiral systems. Chiral drugs like ibuprofen differ in their effectiveness based on the chiral purity of the dose, and artificial sweeteners like aspartame can taste bitter if unwanted enantiomers are not filtered out prior to consumption, owing to the human body's inherent chirality. The need to differentiate and separate the enantiomers of chiral compounds has led to the development of chiral sensors: molecular systems that can identify the enantiomeric purity of a sample.

Coordination polymers (CPs) and metal-organic frameworks (MOFs) are ideally suited to chiral sensing. These crystalline frameworks consist of extended structures of organic linkers bridging metal centres, and are both easily tuned and potentially porous, enabling the incorporation of small guest compounds into their internal voids. When the parent framework is chiral,¹ one enantiomer of a chiral guest molecule will have a stronger interaction with the structure than its opposite. This dichotomy in binding strength can be paired with methods like circular dichroism (CD) spectroscopy and fluorescent techniques to assess a sample's enantiomeric composition.²

This poster presentation will describe the synthesis of a chiral, fluorescent CP and its crystal structure, recorded on the MX1 beamline at the Australian Synchrotron. The ability of this framework to differentiate the enantiomers of chiral guest compounds through fluorescent quenching measurements will also be highlighted.

Level of Expertise

Student

Presenter Gender

Man

Pronouns

He/Him

Which facility did you use for your research

Australian Synchrotron

Students Only - Are you interested in AINSE student funding

No

Do you wish to take part in the Student Poster Slam

Yes

Condition of submission

Yes

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