

Academic Supervisor Looking for an Industry Partner

MOF-Based Nanocarriers for Oral Delivery of Protein and Antibody Therapeutics

Area of Science: Chemical Sciences (Drug Delivery and Materials Chemistry)

Biologic therapies, including proteins and monoclonal antibodies, are transforming modern medicine but remain largely dependent on injectable administration. This creates challenges in patient compliance, increases treatment costs and healthcare burden. Oral delivery remains a major unmet need due to degradation in the gastrointestinal tract and poor absorption. This is particularly relevant for pharmaceutical manufacturing and biologics production, which are major industrial sectors in Ireland.

This project develops metal-organic framework (MOF)-based nanocarriers as a next-generation platform for the oral delivery of protein and antibody therapeutics. MOFs offer tunable porous structures and high loading capacity, enabling protection, controlled release, and improved bioavailability of sensitive biomolecules.

The approach focuses on:

- ❖ Encapsulation of biologics within MOF structures to prevent degradation
- ❖ Controlled release mechanisms to enhance intestinal absorption
- ❖ Optimisation of carrier–protein interactions for improved stability and delivery efficiency

The platform is designed to be scalable, biocompatible, and adaptable across multiple therapeutic areas, with an initial focus on oncology and chronic diseases.

Industry Relevance

The project directly addresses:

- limitations of injectable biologics and patient compliance challenges
- demand for non-invasive and patient-friendly drug delivery systems
- need for scalable platforms for advanced biologic therapeutics

It enables:

- oral delivery of high-value biologics
- reduction in treatment costs and patient burden
- development of next-generation therapeutic formulations

Expected Outcomes

- MOF-based nanocarrier platform for oral biologic delivery
- Improved bioavailability and therapeutic performance
- Reduced reliance on injectable treatments
- Scalable formulation strategies for industry adoption

Industry Mentor Role

- Provide input on formulation and translational requirements
- Guide application areas in pharma and biotech
- Offer periodic advisory feedback (low time commitment)

Contact

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