

An in vitro method for protein cage assembly



THE UNIVERSITY OF
SYDNEY

[2024-035]

Protein cage assembly – New methodology



- > TRL 3 – Proof of Concept
- > Validation in laboratory settings

Problem

Protein cages are widely used in biotechnology for drug delivery and vaccine development. However, current methods rely on *in cellulo* cage assembly, limiting cargo to biomolecules produced by cells. Loading synthetic cargo (like a drug) typically requires harsh disassembly and reassembly processes, which compromises cage stability, fidelity and uniformity. These limitations hinder their use for delivering synthetic molecules, especially in applications requiring precise control over cargo type and stoichiometry. The harsh conditions further restrict compatibility with fragile cargo, making current approaches inefficient and unsuitable for many advanced biotechnological applications.

Solution

This invention presents a new method for assembling protein cages outside of cells, without the need for disassembly. Unlike conventional techniques that rely on complex and often harsh procedures, this approach enables cage formation through a streamlined and controlled process. It overcomes common issues such as poor cargo loading, structural instability, and limited compatibility with synthetic cargo molecules. Unlike viruses, there is also no risk of unwanted mutation or inadvertent host response. The technology offers greater reliability, flexibility, and consistency compared to existing methods, as well as simplifying manufacturing processes, making it well-suited for applications in therapeutics, vaccines, and more. Its simplicity and adaptability position it as a promising platform for future industry collaboration and innovation.

Intellectual Property Status

Provisional Application No: 2024903469

Potential Commercial Applications

— Biopharmaceuticals:

Protein cages can encapsulate therapeutic agents for targeted drug delivery, offering improved stability and controlled release. This technology may support mRNA-based treatments, protein-based formulations, and peptide delivery platforms.

— Vaccines:

The uniformity and fidelity of the cages make them ideal for antigen display and adjuvant packaging for vaccine development.

— Diverse cargo for biotech

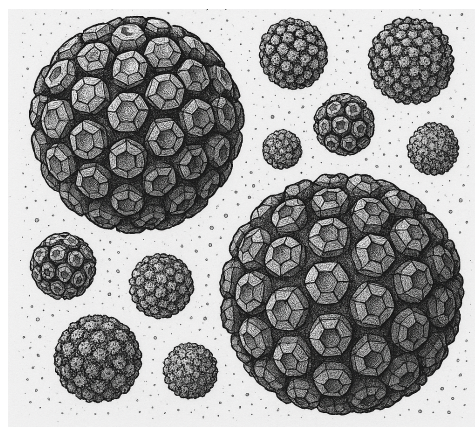
Gentle assembly conditions and in-built modularity make the cages amenable to a large variety of cargos; small molecules, proteins, peptides, and other biomolecules for wide applications in biotech.

Inventors

A/Prof Yu Heng Lau, Dr Taylor Szyszka and PhD candidate Rezwan Siddiquee

Scientific Data

Additional data and information is available at: <https://doi.org/10.1002/anie.202422459>



Contact Commercialisation Office

Jeremy Cohen & Juliana Lebeau

Commercialisation Manager & Associate

Jeremy.cohen@sydney.edu.au | Juliana.lebeau@sydney.edu.au
sydney.edu.au/innovation-and-enterprise