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IDEAS TO LIFE RANGAHAUA KIA WHAI HUA

Ester Bond Scaffolding: A New Protein Platform Technology

A novel 'superglue' utilising ester bonds to join multiple different units together to access many innovative applications.

Problems with Current Systems

Current protein scaffolding systems are based on larger scaffold domains with structures that are assembeled from monomers. This limits the number of different types of "cargo" that can be attached to the scaffold at once, usually to one. What if you want to assemble more than one type of cargo to make a polymeric complex?

Technology

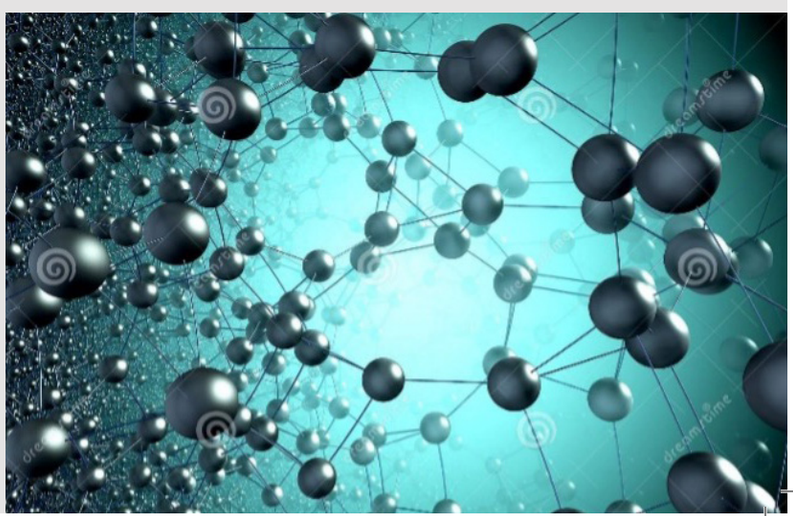
Ester bond scaffolding is a protein platform technology that can join together multiple different proteins using modular building blocks as molecular 'glue'. It is orthoganal, which will facilitate the engineering of tethered-enzyme clusters, presentation of antigen combinations, or linking of any other functional cargo. The technology provides numerous innovations to the field, including:

1. Ability to covalently tether several different antigens to the same structure.
2. Ability to have directed/controlled binding – you can control the exact number and order of tethered subunits.
3. Avoidance of cross-reactivity – each site will only bind the designated subunit.
4. Ability to assemble the complexes within bacterial systems.

Applications

This novel platform technology opens numerous innovative applications in:

- Vaccine optimisation
- Diagnostics
- Environmental biosensors
- Laboratory tools
- Bio-batteries
- Enzyme resilience
- Hydrogel formation
- Antibiotic production
- Multivalent signal activation
- Cell capture
- Assembly of nanoparticles for semiconductors



Major advantages

- The unique covalent ester bond formation can be manipulated to produce a reversible application achieved by pH activated hydrolysis.
- The combination of domains on the higher-ordered structure allows multiple different antigens to clip together along a single structure.
- The self-polymerising ability of the scaffold allows directed assembly of desired structures.
- Broad areas of application ranging from drug production and administration to diagnosis of disorders and diseases.

UniServices by the numbers

Total external research funding:
$261.3M
(35% increase over 2020)

45
companies started in the past five years

$1.25BN
Total market capitalisation of companies formed

$73.5M
Net asset value of the University of Auckland Inventors' Fund

17,335 Covid-19 vaccinators trained by the Immunisation Advisory Centre in 2021

1,700
New Zealand teachers reskilled and upskilled through Tui Tuia | Learning Circle professional learning and development in 2021

3,000
clinical staff at 22 DHBs trained through teamwork-based acute care simulations designed by NetworkZ in the past five years

14,391 times that child and youth mental health workers attended Whāraurau e-modules, trainings and workshops in 2021

UniServices

UniServices is a not-for-profit company of the University of Auckland that champions research and ideas with the power to change the world. From seeking out and bringing together partners in academic institutions, industry and government to build new knowledge and solutions through research; to whakatupu (nurturing) and commercialising the ideas and intellectual property that arise from the University of Auckland's great minds, we act as the kaihono (those who join and link people to people, and people to projects) firmly entrenched in the ecosystem that bridges the world of academia with business, government and our communities.

University of Auckland

Waipapa Taumata Rau | The University of Auckland is New Zealand's largest and leading university. The name Waipapa Taumata Rau, gifted to the University by Ngāti Whātua Ōrākei, refers to the 'place of many peaks' – places to strive for, ascend to and succeed. We also rank in the top 10 globally for sustainable development impact. The University supports economic growth locally and nationally through innovation and entrepreneurship, creating quality jobs and high-value businesses, and producing graduates that contribute to our economy and society for the benefit of all.

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