



Elevating lactose and derivatives through innovative processes and applications

Background

Lactose is a disaccharide composed of glucose and galactose, commonly referred to as milk sugar, as it is recovered primarily from cow's milk. There are multiple applications for lactose in a variety of industries, including food, beverages, pharmaceuticals, infant formula, and nutritional supplements. However, as a commodity-based ingredient, its pricing fluctuates depending on market pressures. Since lactose is typically saturating the marketplace, it is difficult to make the product profitable and to find high-volume uses. A potential solution would be to convert lactose into derivative compounds such as, but not limited to, lactobionic acid, lactitol, galacto-oligosaccharides, and lactulose, which could unlock new product and market opportunities.

What we're looking for

We are in search of transformative technologies that can elevate the value of lactose (including lactose, whey permeate, and de-lactose permeate/mother liquor) beyond its current commodity status. This could include processes that convert lactose into high-demand compounds, the development of high-value products incorporating lactose or its derivatives, and the creation of novel derivatives with scalable production methods and strong market potential. We are also exploring opportunities where lactose or its derivatives can serve as viable replacements for existing high-demand ingredients or compounds, as well as new market applications that expand the commercial potential of lactose-based solutions. By pushing the boundaries of what is possible, we aim to revolutionize the use of lactose and/or its derivatives, creating innovative solutions that meet the evolving needs of various industries.

Solutions of interest include:

- Applications for galactose or galactose-derived products
- Applications for lactobionic acid and/or its salts
- Applications for lactose-based hydrogels
- Applications for lactose-based ingredients (e.g., cosmetics, medical applications, etc.)
- Applications for lactulose
- Applications for polylactose
- Bioactive compounds for food preservation
- Chemical, mechanical, enzymatic, electrochemical conversion of lactose to compounds of interest in materials and polymer chemistry

- Fermentation of lactose into value-added compounds (i.e., materials/polymer chemistry)
- Functional additives for industrial coatings
- Use of lactose derivatives to replace ingredients used in ultra-processed foods

Our must-have requirements are:

- For a new market opportunity, the potential to utilize a minimum of 13,000 tonnes (~28.6 million pounds) of lactose or lactose-derivatives per year
- For process-based solutions, demonstration of technical feasibility (lab-scale validation or pilot data)
- For process-based solutions, the potential for scalable production
- In your proposed solution lactose should have a differentiated advantage over other cheap carbohydrates (i.e., glucose)

Our nice-to-have's are:

- Application in green or sustainable technology
- Capable of using refined (99%) or unrefined (30 to 78%) lactose (i.e., unrefined de-lactose permeate or permeate)
- Cost-competitive with existing alternatives
- Demonstrated market demand or industry partnerships
- Non-toxic and biodegradable under standard conditions
- Patentability or prior intellectual property protection

What's out of scope:

- Ethanol production applications
- Galacto-oligosaccharides
- Poly-lactic acid
- Traditional dairy applications (e.g., lactose-free products)

Acceptable technology readiness levels (TRL): Levels 3-9

1. Basic principles observed
2. Concept development
3. Experimental proof of concept
4. Validated in lab conditions
5. Validated in relevant environment
6. Demonstrated in relevant environment
7. Regulatory approval
8. Product in production
9. Product in market

What we can offer you

Eligible partnership models:

- Sponsored research

Benefits:

- **Sponsored Research**
Up to \$100,000 for 6-12 months Phase 1 activities, inclusive of 15% indirect costs for academic partners. Award amount is dependent on the scope of work.
- **Expertise**
Access to industry mentors.
- **Tools and Technologies**
Access to our pilot plant for scale up and development.
- **Compounds and Reagents**
Delactose permeate, whey permeate and lactose.
- **Data**
Analytical data of input materials, i.e., delactose permeate, whey permeate, and lactose.
- **Facilities and Services**
Visit plants under supervision. Use of pilot-scale fermentation and analytical labs.

Who we are

We are dedicated to producing products and processes that set the standard for excellence. Our commitment to quality means that every product we produce is designed to deliver optimal performance, whether it's enhancing health and wellness benefits or meeting the precise requirements of specialized applications, such as pharmaceutical tablets and infant formula. We work closely with our partners to develop innovative solutions that leverage the unique properties of our products and work effectively in their end products.

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