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Advancing the Arizona State University Knowledge Enterprise

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Method for Increasing Protein Extraction Yield

Cell lysis is an important step for extracting intracellular biomolecules, including nucleic acids and proteins. While there are a plethora of reagents and mechanical techniques to enhance cell disruption and increase extraction yield, these techniques are not universally effective. Certain cells, such as bacterial cells, are notoriously difficult to break open, however, harsher methods may reduce molecular functionality and actually decrease extraction yield. Strategies to effectively lyse cells while retaining biomolecule functionality over a longer duration of time are needed.

Researchers at Arizona State University have developed a novel technique for increasing protein extraction while retaining biomolecule functionality. This technique involves ultra-low temperature storage of the biomass and improves on the existing methods of cell lysis. This technique was tested on three different microbial species with different cell envelope compositions and increased protein yield (in some cases 4.5-fold) was observed. Further, this method can be used in conjunction with lysis buffers for species with tough cell walls.

This technique utilizes a simple and gentle ULT-storage step to improve desired biomolecular yield without impacting the function of sensitive biomolecules such as proteins, peptides and enzymes.

Potential Applications

- Pharmaceuticals – personalized medicines, prophylactics, diagnostics, and more
- Food
- Bioproduction systems – fragrances, biofuels, bioplastics, biopolymers, biochemicals/specialty chemicals, flavors, supplements, etc.
- Agriculture
- Manufacturing

Benefits and Advantages

- Longer term ULT storage maintains the function of biomolecules and reduces the probability of experimental variations
- A simple ULT step can improve cell lysis
  - Incubation for as little as 2 hours can yield double the amount of intracellular protein
- This procedure is independent of cell type and works with different cell lysis cocktails
  - Improves upon the conventional efficiency techniques
- Temperature sensitive biomolecules can retain their function because this step is gentler

For more information about this opportunity, please see

Sarnaik et al - PLoS One - 2021

For more information about the inventor(s) and their research, please see

Dr. Varman's departmental webpage

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