# A New Cell-free Protein Expression System with three-fold higher protein yield in batch and continuous mode than existing systems

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## ABSTRACT

Researchers at the University of California, Davis have developed a method for preparing a bacterial cell lysate that results in higher protein expression than existing cell-free systems. The new whole-cell lysate system comes with additional advantages, including the ability to synthesize protein from linear DNA, directly amenable to continuous or flow-based reaction, and compatibility with existing manufacturing workflow.

## FULL DESCRIPTION

The ability to generate a significant amount of proteins is critical for research and commercial activities such as drug screening and production, x-ray crystallography, and metabolic engineering. Cell-free systems have emerged as a potential method for protein production – in part because they do not require compatibility with the host. Unfortunately, the cost per milligram of protein obtained using existing cell-free systems is currently too high for widespread adoption. While preparation and substrate optimization have led to incremental increases in protein production methods over the years, no significant, qualitative advances in this field have been observed recently.

Researchers at the University of California, Davis have developed methods and compositions of matter for preparing a new cell-free system using an engineered *E. coli* consortium. This new method induces cell-adaptation to the high demand for protein synthesis. The induced cells are then used to generate cell-lysates with high-performance for cell-free protein synthesis. This invention allows for 3-fold higher protein production than currently availably systems in both batch and continuous reaction modes. Furthermore, the new whole-cell lysate system directly allows for the production of proteins from linear DNA (i.e., PCR products and synthetic DNAs). Finally, the preparation of the new system is compatible with existing manufacturing workflow. It requires only the change of cell-strains used for manufacturing.

## APPLICATIONS

- Preparation of a bacterial lysate for *in vitro* or cell-free protein expression
- Use in fields where current techniques of this type are not economically competitive at commercial scale

## FEATURES/BENEFITS

- Results in 3-fold higher protein expression than commercially available, whole-cell lysates
- Results in a more targeted translation machinery than current production methods
- Allows cell-free synthesis of proteins from linear DNA
- Requires only the change of bacterial strains in existing manufacturing workflow

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## INVENTORS

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## OTHER INFORMATION

### KEYWORDS

Cell-free, whole-cell lysate, in vitro transcription and translation, protein expression, E. coli

### CATEGORIZED AS

- **Biotechnology**
  - Other
- **Medical**
  - Delivery Systems
  - Research Tools
- **Research Tools**
  - Protein Synthesis

### RELATED CASES

2019-808-0

- Can be used in both batch and continuous reaction modes

## PATENT STATUS

| Country | Type | Number | Dated | Case |
|---|---|---|---|---|
| United States Of America | Issued Patent | 11453,902 | 09/27/2022 | 2019-808 |

## ADDITIONAL TECHNOLOGIES BY THESE INVENTORS

- Protein Translation Machinery One Shot (TraMOS) Tool
- Generalizable and Non-genetic Approach to Create Metabolically-active-but-non-replicating Bacteria

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