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## Device for Rapid Protein Refolding and Purification

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### BRIEF DESCRIPTION

A new protein refolding device and method that disaggregates and refolds denatured proteins back to their native state at a lower cost and higher efficiency than current methods, reducing the time required from days to minutes.

### FULL DESCRIPTION

E. coli is widely used in the industrial production of therapeutic proteins due to E. coli's low-cost and high yield. However proteins produced by E. coli, especially large and complicated therapeutic proteins, often aggregate as inclusion bodies. Such inclusion bodies are insoluble pellets composed of denatured protein. The disaggregation of inclusion bodies and the refolding the proteins obtained from the inclusion bodies into bioactive forms are challenging, time-consuming, results in poor recovery and accounts for the major cost in production of therapeutic proteins from E. coli.

To bypass these manufacturing problems in E. coli, a much more expensive and low-yield cell system like the mammalian CHO cell line is typically be used to ensure proper protein refolding of complicated proteins such as antibodies. Industrial operations typically avoid producing proteins that require in vitro refolding, and instead focus on protein variants that fold correctly in mammalian cell lines. Thus, potentially effective proteins can be rejected as therapeutics.

Current methods to disaggregate inclusion bodies and to refold denatured proteins can be costly, take multiple days, and require a large volume of media and reagents. This new protein refolding device solves many of the current problems with industrial protein production at a lower cost, a higher efficiency, and a decreased amount of time.

### SUGGESTED USES

This device and method may be scaled to disaggregate inclusion bodies and to refold denatured proteins on a manufacturing scale or as a bench-top device for laboratory experiments.

### PATENT STATUS

Country	Type	Number	Dated	Case
United States Of America	Issued Patent	10,934,324	03/02/2021	2013-884

### STATE OF DEVELOPMENT

A prototype of this device has been built.

### CONTACT

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### INVENTORS

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### OTHER INFORMATION

### KEYWORDS

Denatured, E. Coli, CHO, Protein Refolding, Protein, Refolding, Inclusion bodies

### CATEGORIZED AS

- » **Biotechnology**
- » Health
- » Other
- » Proteomics
- » **Medical**
- » Research Tools

## TESTING

Lysozyme purified from inclusion bodies under denaturing conditions when treated with this novel method and device yielded active lysozyme. To demonstrate the power of this approach, the egg whites of a boiled egg were disaggregated, and the hen egg white lysozyme restored to native functionality, demonstrating correct refolding. Additional examples with recombinant protein from E. coli over-expression have also been demonstrated.

## LEAD INVENTOR

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