Ribo-ITP for Ribosome Profiling

A novel method for ribosome profiling using isotachophoresis (Ribo-ITP) to enhance accuracy and efficiency in analyzing ribosome-associated mRNA.

Case ID:
SJSU ID 2022-018,
UT Ref. 7857 CEN

IP Position:

Patent Pending

Development Status:

TRL 6-7: Representative model or prototype system, which is tested in a relevant environment.

Opportunity

Partners sought for development and prototype testing.

Category(s):

Molecular biology, analytical chemistry, medical research, diagnostic methods, drug development,

Keywords:

Ribosome profiling, mRNA analysis, isotachophoresis, protein synthesis, electrophoresis, high-resolution, biotechnology

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SJSU RESEARCH AND INNOVATION

Technology Overview

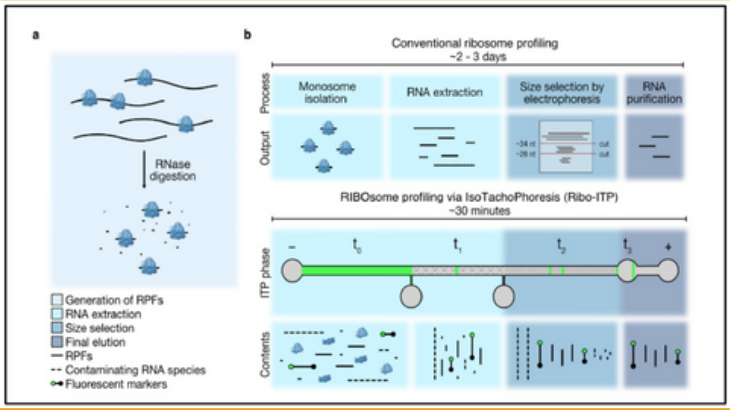
- Ribosome profiling is a powerful technique that provides insights into protein synthesis by examining mRNA fragments protected by ribosomes. Traditional methods, however, face challenges in resolution and sensitivity, often requiring extensive sample preparation and complex instrumentation.
- This technology introduces a method leveraging isotachophoresis (ITP) for ribosome profiling. ITP is an electrophoretic technique that pre-concentrates and separates analytes based on their mobility. By integrating ITP, the method significantly improves the resolution and sensitivity of ribosome profiling, allowing for more accurate analysis of ribosome-protected mRNA fragments. The technique involves applying an electric field to a sample, causing ribosome-mRNA complexes to migrate and concentrate into narrow zones, facilitating precise identification and quantification.

Key Features & Benefits

- **Enhanced Sensitivity:** ITP increases the concentration of ribosome-mRNA complexes, leading to better detection of low-abundance mRNA.
- **Improved Resolution:** This method offers higher resolution in separating ribosome-protected fragments (RPFs) compared to traditional electrophoresis.
- **Efficiency:** Reduces the need for extensive sample preparation, saving time and resources.
- **Scalability:** Suitable for high-throughput applications, making it ideal for large-scale studies.
- **Versatility:** Can be applied to various types of RNA analysis.

Potential Applications

- **Biomedical Research:** Understanding protein synthesis in health and disease.
- **Pharmaceutical Development:** Identifying drug effects on protein synthesis.
- **Genomics:** Studying gene expression and regulation at the translational level.
- **Agricultural Biotechnology:** Enhancing crop traits by analyzing protein synthesis.
- **Environmental Science:** Studying microbial communities and their protein synthesis in different environments.



Figs. 1A-B - Schematic of Ribo-ITP

(A) Schematic of the generation of RPFs.

(B) Schematic of the conventional ribosome profiling protocol and the Ribo-ITP process for extraction of RPFs.