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One Step Acrylamide Gel Electrophoresis with Staining

Patent Pending

A simple rapid detection of protein combining gel electrophoresis and staining is found to be a time saver, efficient, cost effective, and environmentally friendly.

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Key Features:

- Fast and significantly reduces the amount of time for the electrophoresis process
- Mass spectrometry compatible
- Comparable in sensitivity to other gel stains

Field:
Biomedical Science

Technology:
Biomedical Process

Stage of Development:
Process Complete

Status:
Seeking licensee

Patent Status:
Pending

Background:

Gel electrophoresis is the method of choice to gain insight into changes in protein composition, or post-translational modifications that may occur. Applications of protein electrophoresis include purity evaluation, determination of molecular weight, qualitative visualization, and downstream excision and analysis by mass spectrometry. There are different stains that are used to visualize proteins on polyacrylamide gels including Sypro Ruby, silver nitrate, Coomassie dyes (R250 and G250), flamingo, larva purple, stains-all, and deep purple. Most laboratories use Coomassie blue staining as the dye of choice since it is cheap, easy, and scanning can be performed using inexpensive equipment.

Statement of Problem:

Sodium dodecyl sulfate polyacrylamide gel electrophoresis (SDS-PAGE) is a widely used technique for protein separation that requires several steps, including gel electrophoresis on acrylamide gel, staining, destaining, and imaging. Currently, the staining procedure with Coomassie blue yields a very dark background, which would require long destaining process (several hours to complete). Automated electrophoresis procedures using chips technology cannot be used for downstream excision and analysis by mass spectrometry.

Potential Solution:

We developed a faster and more efficient procedure to perform gel electrophoresis and stain in one-step using low Coomassie blue concentrations (0.000625 - 0.00125%). The procedure includes the incorporation of Coomassie blue dye in the electrophoresis buffer during the actual run of SDS- PAGE. The proteins were stained while being separated and only needed to be fixed and image. The digitized images of separated proteins on gels using this one-step procedure is comparable in sensitivity to the standard Coomassie blue, silver-nitrate and Sypro Ruby protein staining procedures. The separated proteins can be utilized for downstream excision and analysis such as mass spectrometry.

Commercialization Status:

Preparation of an environmentally friendly solution (methanol was replaced with ethanol in the 0.1% Coomassie blue stock solution) was evaluated. The shelf life of 20X stock solution stored in the refrigerator for 8 months was determined to be reproducible with minimal reduction in band intensity compared to freshly prepared solution. Future work will focus on the use of this procedure in two-dimensional gel electrophoresis and Western Blotting. We are seeking collaborative partners or licensees in the Biotechnology industry to commercialize it.