

Final Report Summary

Point Detector Optics Characterisation and Optimisation



Lab901 Ltd
<http://www.lab901.com>



UK Astronomy Technology Centre
<http://www.roe.ac.uk/ukatc>

Lab901 and The ScreenTape® System

Lab901 technology improves laboratory efficiency by integrating established molecular biology procedures with novel miniaturisation and automation techniques. Our products provide solutions that meet the needs of a modern lab.

Our revolutionary **ScreenTape®** system is a flexible, tape-based micro-lab offering rapid and automated sample analysis. The fully integrated **ScreenTape®** system automatically processes and analyses biological samples with minimum user effort.

The system comprises a consumable tape component, the Strip, and a processing instrument, the Box. The **ScreenTape®** Strip is a credit-card sized, flexible, plastic tape patterned with miniature features that are loaded with specific chemical reagents. These microfluidic elements enable rapid, parallel processing of biological samples.

ScreenTape® automatically loads, separates and analyses complex mixtures of DNA molecules, using a technique similar to that used in standard gel electrophoresis, enhanced by microfluidic and digital imaging techniques. Efficiency of gel electrophoresis is greatly improved by the ScreenTape® System; a complete cycle of one Strip is completed in less than 8 minutes. The pre-packaged format of ScreenTape® eliminates the need to handle the reagents commonly used in gel electrophoresis.

Different formats of ScreenTape® DNA Strip can analyse a range of DNA fragments from 25-10,000 base pairs.

The Detection System

Analysis of the DNA separation is by way of biological stain that attaches to the DNA fragments, the stain is then excited by illumination at a particular wavelength, the stain fluoresces and the fluorescence is captured by the detection module.

The detection system comprises a photo diode array and lens array such that a virtual slit on the tape is observed. A reading of the light level is then taken over time as the sample travels passed the virtual slit. Analysis is then carried out on the light level over time.

Scope of Work

Phase 1

- Meetings and Liaison
- Assess current Lab901 optical system
- Model existing optical system using Zeemax
 - Principally based on imaging system
 - Provide qualitative consideration of illumination system
 - Model to include existing 'proof of principle rig' and design for 'alpha system'.
- Report and delivery of Phase 1

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Phase 2

- Meetings and Liaison
- This assessment time to be used for either modelling and optimization of LED illumination or analysis of optimal slit dimensions
- Filter measurement / assessment
- Report and delivery of Phase 2

Reports

The following reports were produced by UK ATC;

1. Analysis of the Lab901 ScreenTape® Optical System
2. Lens Options for the Lab901 ScreenTape® Alpha Model
3. Tolerance Analysis for the Lab901 ScreenTape® Alpha Model
4. Lighting Analysis of the Lab901 ScreenTape® Optical System