Bio-SIM-S1: An Automated Biological Sample Aliquoting Processing System (#3357)

Reducing time, costs, and manual steps needed for processing swab samples

Bio-SIM-S1 is a non-contact, automated biological sample aliquoting processing system designed to address the often time-consuming and costly steps involved with processing biological samples. Georgia Tech's patented innovation is particularly well suited to addressing the needs of labs tasked with processing large-scale quantities of cotton-tipped swabs, Dacron applicators, or sponges used for collecting buccal cells and other biological samples for DNA profiling, virus/infectious disease testing, and more.

The system leverages a robotic instrument that reads and records the sample identification number, cuts the swab or applicator containing the biological sample, and places a portion of the sample into a specific location in a designated tube or multi-well plate. Bio-SIM-S1 ensures sample integrity while automating the process of sample cutting and aliquoting, thereby eliminating a manual step of such lab processes. In doing so, it greatly reduces the analyst or technician hours required to process biological samples compared with manual protocols. It also reduces the time and cost of biological processing lab operations.

Benefits/Advantages

- **Automated**: Leverages robotics to eliminate the need for manual aliquoting of biological swab samples
- **Non-contact**: Sidesteps the need for human contact with biological samples during the aliquoting process, thereby reducing risk of sample carryover and cross-contamination
- **Economical**: Offers the potential to lower the costs associated with biological sample aliquoting and processing, especially for large quantities of samples
- **Timesaving**: Significantly reduces the number of technician or analyst hours needed to manually process biological samples, enabling labs to potentially process more samples in less time and acquire results faster
- **Accurate**: Maintains sample integrity and reduces contamination risks by eliminating the need for human contact and lowering risks for human errors such as sample switching or misidentification
- **Robust**: Includes features for 96 well plate mapping, sample setup and processing, barcode reading and sample identification, and data storage
- **User-friendly**: Features a graphical, menu-driven user interface and supports integration with existing data management systems

Potential Commercial Applications

- Biological sample processing
- Biological sample aliquoting
- DNA and forensic screening and testing
- Virus and infectious disease testing
- Buccal cell sample processing

Background/Context for This Invention

One of the first steps in biological sample processing, aliquoting involves taking a sample or portion of samples from a collection device and placing it in a testing container. Cotton swabs, sponges, or Dacron applicators are often used for sample collection as they are inexpensive and typically yield an adequately sized biological sample. However, there is a demand for automating the methods used for introducing these collection devices into appropriate tubes or multi-welled plates for processing. Lab technicians (or analysts in the case of DNA testing) typically manually cut and transfer each swab and place it into the correct well or tube. In DNA testing, a witness is often also required as part of this process. This manual protocol adds time and costs to biological sample processing, especially for large quantities of samples. The labor-intensive process is also subject to human error such as sample switching and misidentification, and can increase risk of cross-contamination.

Georgia Tech's contactless, automated biological sample processing system addresses these shortcomings of current processing methods. Bio-SIM-S1 eliminates the need for manual sample aliquoting, thereby reducing technician hours and lab costs while maintaining sample integrity.

Dr. Cyrus Aidun
Professor – Georgia Tech School of Mechanical Engineering

Patent/IP Information

U.S. Patent Issued

US7745204
https://patents.google.com/patent/US7745204B1/en?oq=7%2C745%2C204

Publications

For more information about this technology, please visit:
https://licensing.research.gatech.edu/technology/bio-sim-s1-automated-biological-sample-aliquoting-processing-system