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Porous Material for DNA Collection

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Invention Description

DNA profiling is now accepted as the most reliable and conclusive method for personal identification. Improved methods of DNA profiling have placed increased demand on the collection efficiency and processing of samples. Current sampling techniques typically involve using a cotton swab for sample collection. Cotton swabs have low collection efficiency due to the adhesion of various types of cells to cotton fibers. This inefficiency creates problems in a number of applications.

To address these issues, researchers at ASU have developed a highly efficient swab comprised of aerogel material and a low-cost method for fabricating the swab. The cross-linked aerogel material can be made to decompose in a fast and controlled manner, resulting in liberation of the entire collected sample. Easily modified surface chemistry provides the ability to alter the mechanical, physical, and chemical properties of the material to optimize sample collection and processing.

Potential Applications

The market for a high efficiency swab is poised to grow rapidly, fueled by the emergence of numerous uses for DNA profiling and the need for enhanced DNA collection.

- **Forensic Evidence Collection Kits** – Kits contain swabs for collection of DNA evidence from blood, semen, or other samples, either under controlled conditions or at a crime scene.
- **Paternity Test Kits** – Testing kits contain swabs for collection of DNA from buccal cells, used both in clinics and at home.
- **Genomic Sequencing (sequencing laboratories and diagnostic kits)** – Testing is often done using a swab to collect buccal or saliva cells.

Benefits and Advantages

The high efficiency swab offers the following advantages:

- **Adjustable Physiochemical Properties** – Easily modified surface chemistry provides the flexibility to alter mechanical, physical, and chemical properties to optimize collection and processing for a particular type of sample.
- **Decomposable Matrix** – Cross-linked polymer aerogel matrix is made to decompose in a controlled manner which liberates the entire amount of collected sample.
- **Strength and Surface Area** – Aerogel material provides a unique combination of mechanical strength and high surface area (300-1000 m^2/g), for efficient collection of various types of sample.