

## Re-imagining forensic technology: Dissolvable materials used in forensic swabs

### Forensic Investigation Tools: Limitations and Opportunities

Forensic swabs are routinely used by crime scene investigators and forensic scientists for the collection of a wide range of biological evidence types. These swabs are used to adsorb blood, saliva, sexual assault evidence, and what is called “touch DNA”: skin cells shed during the process of handling an object. The properties of swabs that make them effective at pulling biological material off of a surface and into the fibers cause problems when releasing the material back at the lab for DNA analysis



Luna has developed an entirely new approach to address this problem: **dissolvable swabs**. By using a fiber that is insoluble in water, ethanol, or other common liquids found around households, but is soluble in DNA extraction buffers, Luna has created a revolutionary new drop-in solution for forensic scientists to gather better evidence and perform higher quality analyses on smaller biological samples.

### Dissolvable Swab Properties

#### Cellulose acetate material

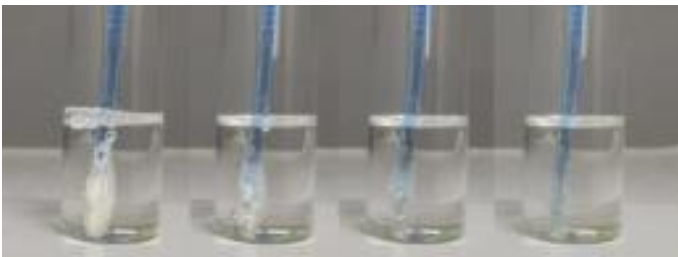
- Inexpensive
- Durable
- Chemical and microbial resistant

#### Nanofibers

- 200 nanometer diameter
- 100x surface area compared to standard cotton swab fibers

#### Solubility

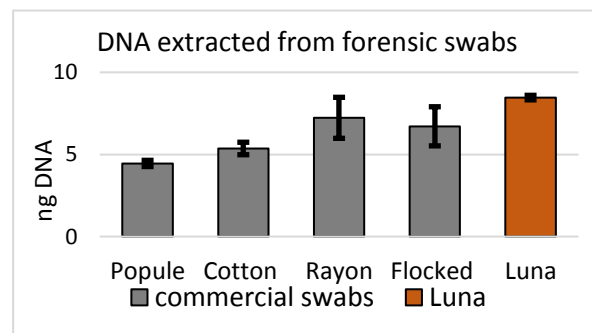
- Insoluble in water, ethanol, or detergents
- Soluble in laboratory DNA extraction buffers



3 minute time-lapse of a cellulose acetate nanofiber swab completely dissolving in a DNA extraction buffer.

Cellulose acetate is soluble in solutions containing high concentrations of chaotropic agents. These kinds of solutions are often found in DNA extraction kits as a means to lyse cells and promote DNA recovery.

In DNA extraction conditions that do not support dissolving swabs, cellulose acetate has demonstrated to be a superior-performing swab material. Luna is currently working to link swab dissolution to maximize the DNA yield for analysis.



Swabs constructed with cellulose acetate nanofibers have been compared to other commercial forensic swabs. In an experiment where swabs first had to adsorb dried blood off of a glass surface, then were extracted using a protocol that does not dissolve the cellulose acetate material, Luna's swabs exhibited excellent DNA extraction performance.