

Development of Latent Fingerprint Impressions using Ophthalmic Fiber Glass Powder

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How to cite this article: Rishaney Bhargava, Vaishnavi Vivek Sawant, Shrutika Singla. Development of Latent Fingerprint Impressions using Ophthalmic Fiber Glass Powder. Medico Legal Update, Vol 23 Special Issue 2023.

Abstract

Fingerprints are a vital and unique identity of a person. These are impressions left by the friction ridges of a human finger on contact with any surface. The primary advantage of a fingerprint is that it does not change over time. Fingerprint identification is a method of identification using the impression formed by the minute ridges seen on the fingertips. Fingerprints have certain individual characteristics that are unique. Fingerprints are most generally recovered from crime scenes. Such prints are obtained when natural oils and perspiration (sweat) existing between the fingertip ridges are transferred to the surface by any contact. Fingerprints are invisible and are much harder to detect and preserve. These prints are obtained by physical and chemical methods. In this paper, my research focuses on detecting latent fingerprints or invisible fingerprints using ophthalmic fiber glass powder on different surfaces. Here I used the ophthalmic fiber glass and turned it into powder which is used for obtaining latent fingerprints.

Keywords: Latent, Fingerprint, White powder, Crime scene, Powder, Fiber, Glass, Ophthalmic.

Introduction

As Dr. Edmond Locard (1877-1966) had given a principle that "Every contact leaves a trace", the human's fingers also leaves a trace known as fingerprints. A Fingerprint is an impression left by the friction ridges of human fingers^{1,2}. These are made from an association of ridges, known as friction ridges. Each ridge consists of pores that are connected to the sweat gland below the skin that are responsible to produce sweat in hands which. When we touch somewhere with our hands, due to sweat the ridge trace develops on the surface, which is a fingerprint

impression³. All of the ridges of fingerprints have patterns referred to as loops, whorls, arches or composites. Fingerprints are one of the maximum treasured styles of proof because of their uniqueness and individuality⁴. They are discovered on items as evidence at scene of crime and are used to find the suspect or criminal and link them to the crime scene. "Latent fingerprint" is an impression of fingerprint formed by friction ridges on bulb of fingers, which is not apparent to the eye but can be made sufficiently visible through physical or chemical methods. Physical methods like powder method and chemical

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method like fuming method⁵. Latent prints may be discovered on a lot of surfaces; however, they're now no longer quite simply seen and detection frequently calls for using fingerprint powders, chemical reagent or exchange mild sources. Latent fingerprints do not show fluorescence on their own and so the various fluorescent powders are used. The powder approach for detecting latent fingerprints entails the utility of a finely divided formula to the finger-mark impression, normally with a glass-fiber or a makeup brush. The powder automatically adhered to the sweat residue defining ridge pattern⁶.

Fingerprints can be printed anywhere, even on the human body. Based on the practicals, fingerprint impressions are classified into three classes consistent with the kind of surface on which they may be determined and whether or not they're seen, fingerprints on smooth surfaces (which includes soap, wax, moist paint, sparkling caulk, etc.) are probable to be 3 - dimensional which are plastic prints; the ones on tough surfaces are both patent (visible) or latent (invisible) prints. Visible prints are fashioned whilst blood, dirt, ink, paint, etc. is transferred from finger to any surface. Patent prints may be discovered on huge sorts of surfaces; smooth and rough, porous (along with paper material or wood) or non-porous (along with metal, glass or plastic). This research paper is mainly concerned with latent (invisible) prints, or we can say a method for development of latent fingerprint development^{7,8}.

Materials and Methodology

Latent or invisible prints can be found in various crime scenes, and it is considered as a piece of valuable evidence. There are different methods for developing latent prints. The powder method is one of the common methods used for development of latent fingerprints. In this research, a new method of latent fingerprint development is done, i.e., developing prints by the usage of ophthalmic fiber glass powder. This comes under the powder method of latent fingerprint development methods. Latent fingerprints were collected from various surfaces like plastic, mobile phone screens, etc. using the powder method. Here we use the ophthalmic fiber

glass powder to extract or develop latent prints. This ophthalmic fiber glass powder is generally found at the industries which make fiber glass or at the firms where the spectacles are made putting fiber glasses in them. The firms and industries throw them as a waste powder but it can be used as white powder for the development of latent prints. This powder can be commonly available and is cheap as it is just a waste of fiber glass to the optometrists or the firms making the spectacles. During cutting of fiber glasses the powder is formed which used for development of fingerprint on different surfaces. The powder was dusted on the surface where the latent print is to be extracted using a fingerprint dusting brush or clean and soft makeup brush. Using the brush, lightly apply the powder on the fingerprint and obtain a clear print. On applying the dusting method, the powder gets attached to the surface due to the perspiration, oil and other constituents from the finger which is shifted to the fingerprint. After the fingerprint was visible with all the ridges, we photographed the latent print and then we lifted it carefully with the help of cellophane tape and preserved it properly. Then from the obtained prints we identified type and pattern of fingerprint.

Result and Discussion

The result of the research on the latent (invisible) fingerprint exhibits the development of latent fingerprints from different surfaces like plastic, mobile phone screen, etc. as shown in Figures 1 to 9 using ophthalmic fiber glass powder.

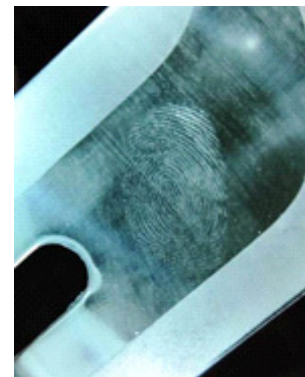


Figure 1: Development of Latent Fingerprint with the help of ophthalmic fiber glass powder on Metal handle surface.



Figure 2: Development of Latent Fingerprint with the help of ophthalmic fiber glass powder on Glass surface.



Figure 3: Development of Latent Fingerprint with the help of ophthalmic fiber glass powder on Oil-paint surface.



Figure 4 (a) and (b): Development of Latent Fingerprint with the help of ophthalmic fiber glass powder on Plastic surface.



Figure 5: Development of Latent Fingerprint with the help of ophthalmic fiber glass powder on Mirror surface.



Figure 6: Development of Latent Fingerprint with the help of ophthalmic fiber glass powder on Rough plastic surface.



Figure 7: Development of Latent Fingerprint with the help of ophthalmic fiber glass powder on Metallic surface.



Figure 8: Development of Latent Fingerprint with the help of ophthalmic fiber glass powder on Car key (hard rubber) surface.

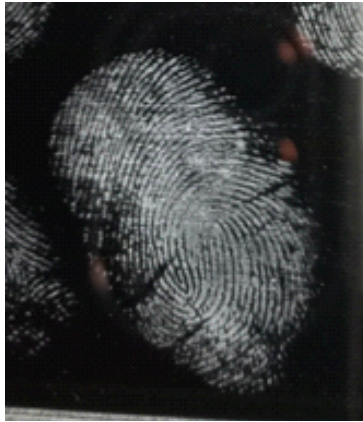


Figure 9: Development of Latent Fingerprint with the help of ophthalmic fiber glass powder on Mobile phone screen surface.

Powders are an excellent medium to develop latent or invisible prints. As ophthalmic fiber glass powder is white in color, so it gives excellent results on dark color surfaces. Thus, the results of the research revealed that the latent fingerprints present on the majority of the surface examined can be successfully developed using ophthalmic fiber glass powder for performing the powder method for the visualization of these invisible prints. The comparative evaluation of different surfaces with this powder manifested that it provides a final result on contrast surfaces than on the other surfaces examined.

The occurrence of latent fingerprints presents on the surface like plastic, mobile phone screen, etc. could be successfully done and their ridge features or ridge minutiae could be seen clearly. The present-day is just a preliminary investigation and can be explored further.

Conclusion

Ophthalmic fiber glass powder is generally found at the industries which make fiber glass or at the firms where the spectacles are made. This powder is commonly available and cheap as it is just a waste of fiber glass to the optometrists. This powder can be used successfully on various surfaces

to develop prints in crime investigations. The print was successfully developed using the powder on all the surfaces (Metal, Glass, Oil Paint, Plastic, Rough Plastic, Mirror, Car key and Mobile Screen.) and has clear ridge characteristics present.

Conflict of Interest: Authors do not have any conflict of interest.

Source of Funding: No funding provided.

Ethical Clearance: No ethical required for the work.

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