Easylift: A novel tape lifting system

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Adhesive-coated transparent tapes have long been used as the tool of choice when recovering trace evidence from a variety of surfaces [1-3]. These tapes have a number of key advantages. These include their ability to readily isolate evidentially valuable materials from the substrate on which they are found and the fact that these materials can be easily secured by adhering the tape to a suitable backing, such as acetate sheet. The transparency of these tapes also means that low-power microscopy can be used to search for trace items that may be adhered to them [4]. Such items have the potential to provide evidence of contact between the perpetrator and/or victim of a crime and the surface from which such items have been recovered.

The use of tapes to recover trace evidence is frequently referred to as tape lifting and the tapes once used for this purpose and secured to a backing are known as tape lifts.

Conventional tape lifts have the disadvantage that they are birefringent, making them incompatible with polarising light microscopy (PLM). Also, items recovered on tape lifts are typically surrounded by minute air bubbles, making the microscopic characterisation of their morphological features problematic. The current solution to these problems is to remove the items of potential value prior to their full characterisation . For example, it is common practice to dissect tape lifts to isolate fibres of evidential interest and then mount these on glass slides prior to examination using PLM. This is a very time-consuming [5] and, consequently, expensive process and one which increases the opportunities for evidence loss and contamination.

We have therefore devised a new tape lifting system that is effectively non-birefringent and which embeds the trace evidence items that it contains in a medium of suitable optical properties. These features mean that the items of evidence on the new tape lift (known as Easylift) can be characterised *in situ* by PLM, microspectrophotometry and Raman microscopy. If needs be, these items can be readily removed from the new system for further characterisation. We expect that Easylift will be compatible with DNA profiling and sequencing, but this has yet to be verified empirically.

In its current form, Easylift has two parts. One of these is for use at the crime scene or when searching garments or other objects in the laboratory. It consists of an adhesive tape attached to a backing film. The tape is similar in appearance to that used for conventional tape lifting. In use, this new tape is removed from its backing, an operation that is easy to accomplish whilst wearing nitrile gloves (Figure 1), and then applied to the surface to be sampled (Figure 2). It is then removed from this surface, after repeat application if desired, and re-adhered to the backing material. There is no need to take care to eliminate bubbles during this process. It is then packaged and sent for analysis.

The second part is for use in the laboratory. It is a glass slide that is pre-coated on one side. This coating is protected with a backing film (Figure 3). In use, the backing films are removed from both parts of the new system and the tape, together with the items of evidence adhered to it, is placed onto the slide, such that the adhesive on the tape is in contact with the coating on the slide. The two parts of the system are now sealed together by means of low temperature heated rollers. This removes air bubbles, trapping evidence within a transparent environment (Figure 4). This evidence can now be characterised by the methods listed above. If needs be, items of evidence may be retrieved from the new tape lift system by passing it through the rollers and removing the tape from the slide whilst it is still warm. Alternatively, items can be readily removed from the tape before it is placed onto the coated slide.

As can be seen, this system is quick and easy to use and, other than the rollers, does not require the use of any specialised equipment. Also, in contrast to many traditional slide-making methods, the preparation of slides with this system does not require the use of harmful solvents. Furthermore, we are confident that this system will be compatible with modern data capture systems that allow images of entire microscope slides to be generated, offering the prospect of semi-automated or fully automated fibre characterisation.

Easylift has been trialled by Staffordshire Police at volume crime scenes. It has been used to recover trace materials from areas of interest, including car seats, seat belts and window frames from points of entry. Feedback from the Scenes of Crime Officers is shown in Figure 5. Easylift has also been reviewed by forensic practitioners who analyse fibres and other particulates in casework. Practitioners from the UK, the Netherlands, Germany and Australia have provided feedback. Comments are shown in Figure 6.

This novel system is currently being patented (patent application numbers 10735037.3 [European] and 13/382208 [USA]). We are currently working with the Netherlands Forensic Institute to further establish the utility of this system and with a major supplier of forensic science equipment and consumables to refine its manufacture. If you are interested in finding out more about Easylift, or in working with us to bring it to market, please contact either of us for further information.

References

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