Caught red-handed: Detection of latent fingerprints through release of fluorescein from a nanofiber mat

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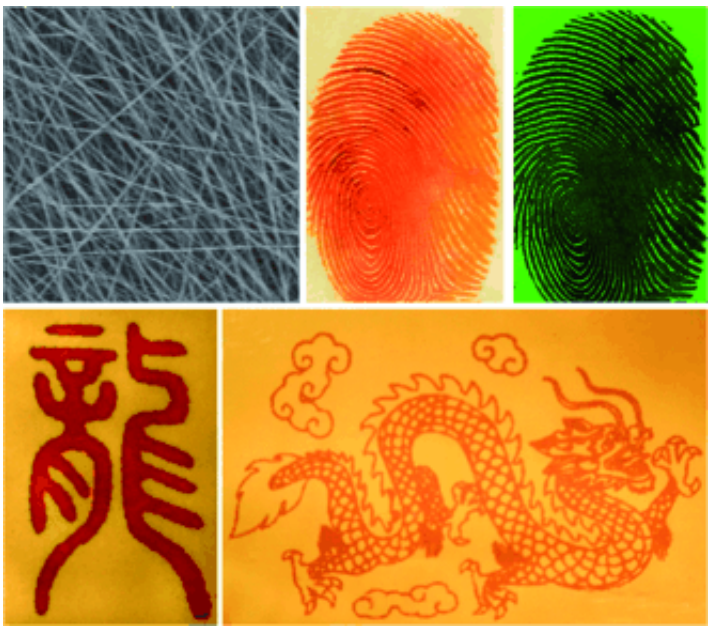

(PhysOrg.com) -- When a forensic agent dusts a surface with powder or exposes it to the vapors of an iodine chamber, mystery fans know what is going on: This is how latent fingerprints are made visible so that they can be compared to those of a suspect. Su Chen and a team at Nanjing University of Technology have now developed a new process for especially rapid and simple detection of fingerprints. As the Chinese

researchers report in the journal *Angewandte Chemie*, all it takes is a special nanofiber mat that is pressed onto the suspect surface and briefly treated with hot air -- the fingerprints appear as red ridge patterns.

When we touch a surface, tiny traces of perspiration and oils stay behind, mirroring the ridge patterns on our fingertips. There are now a number of different methods to make these latent fingerprints visible. The new method is significantly faster than the classic technique of dusting with powder. Unlike spectroscopic methods, it does not require complex technical instruments, and problematic chemicals like ninydrin are not needed either. In addition, it is suitable for all types of surfaces: by lightly pressing the mat onto the surface, the researchers were able to reliably transfer fingerprints from a wide variety of materials, including steel, quartz, glass, plastic, marble, and wood.

The secret of their success is the special mat, a fleece made from nanofibers of thermoplastic polyurethane and fluorescein, a dye. The mat is made in a process called electrospinning. When the mat comes into contact with a fingerprint, components of the perspiration react with the polyurethane, causing cross-linking of the polymer chains. The hot air accelerates the reaction. In the cross-linked regions, the fluorescein cannot remain within the fibers so it comes out as a powdery solid. However, the dye only fluoresces when it is very finely dispersed in the nanofibers, not when it is in small solid clumps. This causes the color of the mat to change from straw yellow to red, making the fingerprint visible within 30 seconds in daylight. The method only works with nanofibers, because only they have enough surface area to produce a visible reaction.

The mat can identify more than mere fingerprints. The researchers were able to "print" an image of a small dragon onto the mat by using an ink-jet printer. Their ink was simply water, which can also cause the cross-linking reaction. The combination of ink-jet printing and the release of a

chemical from a nanofiber mat could also be used to produce miniaturized systems such as sensors, microreactors, and diagnostic chips.

More information: Su Chen, et al., A Release-Induced Response for the Rapid Recognition of Latent Fingerprints and Formation of Inkjet-Printed Patterns, *Angewandte Chemie International Edition* 2011, 50, No. 16, 3706–3709, Permalink to the article: dx.doi.org/10.1002/anie.201006537

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