**Från olika källor**

# maj – juni 2018

# **Highly-luminescent Eu,Sm,Mn-doped CaS up/down Conversion Nano-particles: Application to Ultrasensitive Latent Fingerprint Detection and In Vivo Bioimaging**

Wang, J; He, N; Zhu, Y; An, Z; Chen, P; Grimes, CA; Nie, Z; Cai, Q.

Chemical Communications, 2018 Jan 16;54(6):591-594. doi: 10.1039/c7cc07790d, **www.ncbi.nlm.nih.gov**

Due to their unique properties, rare-earth doped upconversion luminescence (UCL) nanomaterials are of considerable scientific interest. Meanwhile, alkaline-earth sulfide materials based on a completely different electron trapping (ET) mechanism demonstrate extremely high UCL efficiencies, which are several dozens of times more than those of conventional fluoride UCL nanomaterials. However, the large particle size, easy hydrolysis, and difficulty in achieving uniform dispersion have precluded bioassay applications. Herein, we have synthesized super-bright Eu,Sm,Mn-doped CaS nanoparticles of ∼30 nm average particle size using a reverse microemulsion technique. The UCL quantum yield was up to nearly 60%. Modification of the nanoparticles with an organic layer allows their stable dispersion throughout aqueous solutions without significant loss of the fluorescence intensity. We demonstrate the application of the novel UCL materials to latent fingerprint detection, deep tissue imaging, and in vivo bioimaging.

# **Ultrabright Fluorescent Silica Nanoparticles Embedded with Conjugated Oligomers and Their Application in Latent Fingerprint Detection.**

Zhang, S; Liu, R; Cui, Q; Yang, Y; Cao, Q; Xu, W; Li, L.

ACS Applied Materials & Interfaces, 2017 9 (50), 44134-44145, DOI: 10.1021/acsami.7b15612, **www.ncbi.nlm.nih.gov**

Fluorescent micro- and nanosized particles have a broad range of applications in biology, medicine, and engineering. For these uses, the materials should have high emission efficiency and good photostability. However, many organic fluorophores suffer from aggregation-induced quenching effects and photobleaching. Here, we used a simple method based on covalently blending a fluorescent conjugated oligomer with silica nanoparticles to achieve emission quantum yields as high as 97%. The resulting system also showed excellent stability under continuous light illumination, in a range of pH values and temperatures, and in common solvents. This fluorescent material showed outstanding properties, including highly efficient blue emission, low cost, low toxicity, and easy synthesis. Furthermore, its effectiveness for latent fingerprint detection was demonstrated as a proof of

concept on various substrates. The obtained emissive fingerprint powder gave good optical/fluorescent images with high contrast and resolution between the ridges and spaces.

# **Visualization of Aged Fingerprints with an Ultraviolet Laser**

Akiba, N.; Kuroki, K.; Kuro, K.

Journal of Forensic Sciences, 63: 556–562. doi:10.1111/15564029.13588, onlinelibrary.wiley.com

Detection of aged fingerprints is difficult because they can degrade over time with exposure to light, moisture, and temperature. In this study, aging fingerprints were visualized by time-resolved spectroscopy with an ultraviolet-pulsed laser. Fingerprints were prepared on glass slides and paper and then stored under three lighting conditions and two humidity conditions for up to a year. The fluorescence intensities of the fingerprints decreased with time. Samples were stored in the dark degraded less than in sunlight or under a fluorescent lamp. Samples were stored under low humidity degraded less than under moderate humidity. As the storage period increased, a fluorescence emission peak appeared that was at a longer wavelength than the peak visible in earlier spectra. This peak was used for visualization of an aged fingerprint over time. An image of the fingerprint was not initially visible, but an image appeared as the time since deposition of the fingerprint increased.

# **Latent Fingermark Development on Thermal Paper using 1,2-Indanedione/Zinc and Polyvinylpyrrolidone**

Hong, S.; Kim, M.; Yu, S.

Journal of Forensic Sciences, 63: 548–555. doi:10.1111/15564029.13585, onlinelibrary.wiley.com

Polyvinylpyrrolidone (PVP) has been used in combination with 1,2-indanedione (1,2-IND) and ZnCl2 (Zn) to develop latent fingermarks. The results show that the optimal ratio of 1,2IND/Zn:PVP is 1.0:0.4 (the concentration of PVP is 8%) for developing fingermark. The developed formulation was tested on the surfaces of 12 kinds of thermal papers. The variation in the fingermark development efficiency was observed within the same and among different kinds of thermal papers. The fingermark development efficiency was mostly better on the thermally sensitive surface compared to the thermally nonsensitive surface. However, similar or even better development was observed from a few thermally nonsensitive surfaces. The present method has shown better efficiency compared to the three other proposed methods on the thermally sensitive surface. In contrast, the

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present method was proven not the best for the thermally nonsensitive surface.

# **Autopsy Fingerprint Technique Using Fingerprint Powder**

Morgan, L; Johnson, M.; Cornelison, J.; Isaac, C,; DeJong, J.; Prahlow, J.

Journal of Forensic Sciences, Volume 63, Issue 1, January 2018, Pages 262–265, DOI: 10.1111/1556-4029.13532, www. onlinelibrary.wiley.com

The collection of high-quality fingerprints is an important component of routine forensic autopsies and represents one of the several potential methods for identifying a decedent. Fingerprint collection at autopsy frequently employs a manual method using fingerprint ink and cards, although some offices use digitalscanning equipment. While these methodologies are adequate in most circumstances, this study introduces an alternative method using fingerprint powder and adhesive labels. The method is quick, easy to perform, and cost-effective and provides the additional advantage of an adhesive label that easily conforms to the finger, palm, or foot which reduces smudging of prints in individuals with rigor mortis, skin slippage, or decomposition compared to more traditional autopsy fingerprint collection techniques. The prints can then be easily stored, either in hardcopy form or scanned to make a digital record.

# **An Optimized DNA Analysis Workflow for the Sampling, Extraction, and Concentration of DNA obtained from Archived Latent Fingerprints**

Journal of Forensic Sciences, Volume 63, Issue 1, January 2018, Pages 47–57, DOI: 10.1111/1556-4029.13504, www. onlinelibrary.wiley.com

Solomon, A.; Hytinen, M.; McClain, A.; Miller, M.; Cruz, T.

DNA profiles have been obtained from fingerprints, but there is limited knowledge regarding DNA analysis from archived latent fingerprints—touch DNA “sandwiched” between adhesive and paper. Thus, this study sought to comparatively analyze a variety of collection and analytical methods in an effort to seek an optimized workflow for this specific sample type. Untreated and treated archived latent fingerprints were utilized to compare different biological sampling techniques, swab diluents, DNA extraction systems, DNA concentration practices, and postamplification purification methods. Archived latent fingerprints disassembled and sampled via direct cutting, followed by DNA extracted using the QIAamp® DNA Investigator Kit, and concentration with Centri-Sep™ columns increased the

odds of obtaining an STR profile. Using the recommended DNA workflow, 9 of the 10 samples provided STR profiles, which included 7–100% of the expected STR alleles and two full profiles. Thus, with carefully selected procedures, archived latent fingerprints can be a viable DNA source for criminal investigations including cold/postconviction cases.

# **Human Factors Effecting Forensic Decision Making: Workplace Stress and Well-being**

Journal of Forensic Sciences, Volume 63, Issue 1, January 2018, Pages 258–261, DOI: 10.1111/1556-4029.13533, www. onlinelibrary.wiley.com

Jeanguenat, A.; Dror, I.

Over the past decade, there has been a growing openness about the importance of human factors in forensic work. However, most of it focused on cognitive bias, and neglected issues of workplace wellness and stress. Forensic scientists work in a dynamic environment that includes common workplace pressures such as workload volume, tight deadlines, lack of advancement, number of working hours, low salary, technology distractions, and fluctuating priorities. However, in addition, forensic scientists also encounter a number of industry-specific pressures, such as technique criticism, repeated exposure to crime scenes or horrific case details, access to funding, working in an adversarial legal system, and zero tolerance for “errors”. Thus, stress is an important human factor to mitigate for overall error management, productivity and decision quality (not to mention the well-being of the examiners themselves). Techniques such as mindfulness can become powerful tools to enhance work and decision quality