Novel fluorescent organohydrogel proposed to achieve dual information encryption

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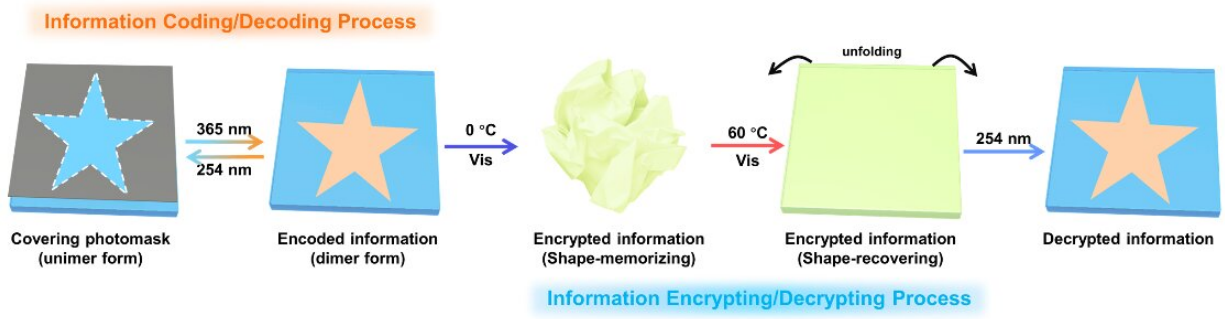

The information coding/decoding and encryption/decryption based on the fluorescent organohydrogel. Credit: NIMTE

The Smart Polymer Materials Group led by Prof. Chen Tao at the Ningbo Institute of Materials Technology and Engineering (NIMTE) of the Chinese Academy of Sciences (CAS) has developed a novel fluorescent organohydrogel with shape-memory ability, which could achieve photo-writing/photo-erasing and dual encryption of fluorescent information. This study was published in *Advanced Optical Materials*.

With the rapid development of information technology that offers great convenience in daily life, counterfeiting information has inevitably emerged as a global hot issue that poses potential threats to human health , social economy and even national security.

Due to the responsiveness to ultraviolet (UV) light, the diversity of vivid colors and excellent modifiability, fluorescent hydrogels are considered to be one of the best candidates for anticounterfeiting, though the information security level needs to be further improved to cope with sophisticated hacking technique upgrades.

Through interpenetrating hydrogel and organogel polymer networks, the researchers fabricated a high-performance fluorescent organohydrogel for information encryption. The green-yellow-emitting fluorescent unit was introduced in the hydrophilic Poly(N,N-dimethylacrylamide) hydrogel network, while the blue-emitting anthracene unit (blue emission) was copolymerized in the hydrophobic polystearate methacrylate organogel polymer network.

Thanks to the photoswitching properties of the anthracene moieties, UV light of 365 nm triggered the unimer-dimer transition, leading to the dynamic fluorescent change of organohydrogel from blue to faint yellow. Besides, the organohydrogel could recover to blue fluorescent color when exposed to UV light of 254 nm. In this case, cyclic light-writing/light-erasing of information can be achieved by virtue of photomasks.

In addition, the crystallization property endows the fluorescent organohydrogel with the shape-memory ability, thus achieving dual encryption of information.

The study on the synthesized fluorescent organohydrogel may provide a new idea for the design and fabrication of smart anti-counterfeiting materials, facilitating information encryption/decryption at a high information security level.

More information: Hui Shang et al, Integrating Photorewritable Fluorescent Information in Shape-Memory Organohydrogel Toward

Dual Encryption, *Advanced Optical Materials* (2022). DOI: 10.1002/adom.202200608

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