

A Self-healable Electroluminescent Devices

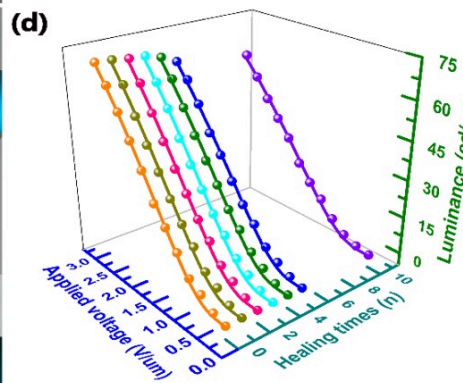
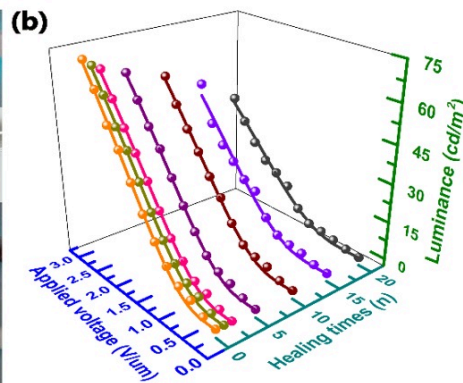
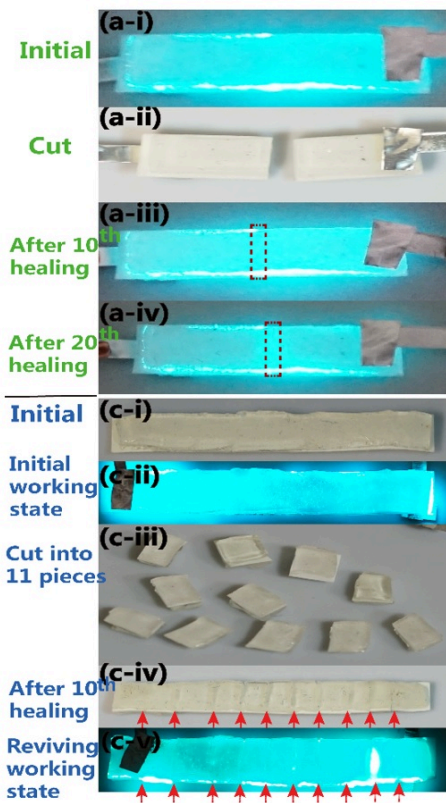
Communications & Information

Health & Wellness

Consumer Electronics

Nanotechnology and New Materials

Smart Mobility and Electric Vehicle



IP Status
Patent granted

Technology Readiness Level (TRL) ?

6

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Opportunity

Electroluminescent(EL) devices have acted as indispensable emitting light modular elements in well-developed and sophisticated electronic systems, for example, the EL panels can serve as backlighting source in car control panel. Driven by the diverse demands for the versatile systems in daily life as well as in integrated industries, EL devices have penetrated into various research fields of flexible and stretchable electronics such as bio-inspired soft robotics for visual disguise and artificial skin actuators, wearable electronics, digital displays and sensors. The primary concern in utilizing EL integrated in flexible and stretchable electronics systems locates at the inevitably mechanical deformations and the concomitant damages, where the failure of device performance occurs if the strain exceeds the withstanding limit. In addition, maintaining and replacing a dysfunctional



component in a multifunctional integrated electronic system is either intractable or costly. Thus, the designed healable can solve this problem and also can be expanded to other sorts of similar materials to realize the healable light-emitting devices.

Technology

The invention was an elegantly self-healing EL device by utilizing self-healable ionic conductor and healable dielectric polymer matrix. The as-fabricated healable EL devices were mechanically flexible, and the physicochemical properties of each individual healable layer could be well restored after experiencing catastrophic damages, such as several dozen times of cut at fixed location and at unfixed locations. As a result, the luminescent performance of full devices can be fully recovered. Besides the healing of fracture damages within a single EL device, the inter-device healing have also been developed for the first time to enable device-level assembly, aiming at simplifying the complex and costly processes for repair and replacement of individual EL modular units in integrated electronic systems. The conceptual 'LEGO' assembly process of light-emitting devices are also first achieved by all these EL component layers assembled together in virtue of the self-healing properties of each layer.

Advantages

- Can be easily adopted in the complex electronic systems as a light emitting module.
- Can preserve luminance properties even after tens cut-healing cycles
- Large EL units can be divided into smaller ones, while keeping all the properties and functions. 97 / 5000 Translation results
- Different EL devices can be assembled into an integrated EL system by a simplified self-healing strategy

Applications

- Flexible and healable electroluminescent device
- Light-emitting component in a multifunctional integrated electronic system.

