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An in Situ Dna Content Detection Enabled by Organic Long-persistent Luminescence Materials with Tunable Afterglow-time in Water and Air

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Abstract : Purely organic long-persistent luminescence materials (OLPLMs) have been developed as emerging organic materials due to their simple production process, low preparation cost and better biocompatibilities. Notably, OLPLMs with afterglow-time-tunable long-persistent luminescence (LPL) characteristics enable higher-level protection applications and have great prospects in biological applications. The realization of these advanced performances depends on our ability to gradually tune LPL duration under ambient conditions, however, the strategies to achieve this are few due to the lack of unambiguous mechanisms. Here, we propose a two-step strategy to gradually tune LPL duration of OLPLMs over a wide range of seconds in water and air, by using derivatives as the guest and introducing a third-party material into the host-immobilized host–guest doping system. Based on this strategy, we develop an analysis method for deoxyribonucleic acid (DNA) content detection without DNA separation in aqueous samples, which circumvents the influence of the chromophore, fluorophore and other interferents in vivo, enabling a certain degree of in situ detection that is difficult to achieve using today's methods. This work will expedite the development of afterglow-time-tunable OLPLMs and expand new horizons for their applications in data protection, bio-detection, and bio-sensing

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