

A Simple, Inexpensive, and General Photoluminescent Sensor Platform for Multiple Analytes

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Abstract

About a decade ago, we discovered a facile method to enhance the luminescence from lanthanides through the self-assembly of multiple components in a metallohydrogel. Using this strategy, we have developed a pro-sensitizer ('masked sensitizer') based protocol for sensing enzymes and a few small molecules. We have also found that some natural products and clinically used drugs can sensitize lanthanides. The gel-based platform, therefore, provides opportunities to detect and quantify such species as well.

The advantage of this technique is that the output (green/red photoluminescence from Tb^{3+}/Eu^{3+}) is independent of the analyte being sensed, and in many cases, pre-processing of the sample is not required. For several enzymes present in blood serum and natural product extracts, the presence of the analyte can be readily inferred using an inexpensive, hand-held long-wave UV lamp. To simplify the assay, we have developed a low-cost, paper-based method and a portable device, and believe that further developments can lead to useful, real-life applications.