

Development and application of sensitive methods with luminescence detections for determination of biologically related compounds

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Drugs are biologically active and affect vital activity of human, which sometimes comes to a serious or fatal risk factor of disease. For example, abused drugs such as stimulants and opiates cause psychological or physical disorder by acting CNS. These drugs have been abused illegally and caused serious social problems worldwide. Therefore, it becomes a very important social issue to predict of and prevent from the risks for human health. On the other, although the bioactive components exist in a very minute amount in a body, the small changes in their levels seriously affect homeostasis. Thus, sensitive and selective analyses of these biologically-related compounds are essential to maintain human health or understand homeostasis.

We have developed sensitive and selective analyses of biologically-related compounds, especially for drugs of abuse, and expanded their practical applications. In the presentation, the results of our past studies will be discussed.

Development and application of chemiluminescence (CL) and fluorescence (FL) reagents

FL and CL detections have been used in sensitive and selective methods in a variety of scientific fields. Meanwhile, the development of reagents for these methods is not easy, especially for CL reagents. We have tried to develop several kinds of fluorescence and CL reagents, which were applied to many analytes such as hydrogen peroxide, glucose, uric acid and phospholipids by a batch method.

High sensitive HPLC determination of biologically-related compounds

The HPLC methods with FL or CL detection for highly sensitive and selective determination of biologically-related compounds such as hormones, aldehydes, fatty acids, peroxides, phenols, stimulants and opiates, were developed and applied to many biological samples. Especially, we focused on the hair analysis of stimulants, anorectics and opiates, and developed usable methods for ultra-trace of these compounds in hair samples. The methods could elucidate an intake history of these drugs during a long-term by a segment analysis. Drug-drug interactions of these drugs were also examined to clarify the risks of concomitant uses to human health by using a microdialysis technique.