# 用於快速食品甲醛檢測的熒光探針
Development of Fluorescent Probes for Rapid Detection of Formaldehyde in Food

一種高化學選擇性的創新食品甲醛視覺檢測方法
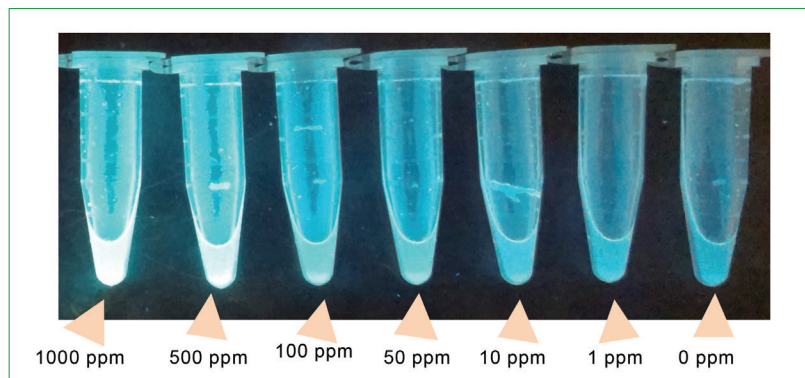## A novel method for visual detection of formaldehyde in food with excellent chemoselectivity

甲醛乃被本港及內地禁止使用於食品的添加物，但近年食物中曾被發現含過量甲醛，引起民眾的健康關注。而事實上，一些不法商人往往利用甲醛作非法食物加工、漂白和延長食物保質期。氣相層析法和液相層析法是傳統的甲醛檢測方法，但須用到昂貴的儀器和高技術人員，並不適用於現場檢測。與廣東出入境檢驗檢疫局合作，理大的熒光探針測試法正嘗試解決這問題。這是第一次利用在金(III)複合物的介導下，樹脂聯接的位阻大的胺和熒光炔烴的三組分耦合反應作為甲醛視覺檢測方法。此測試化學選擇性高、結果精確，在現場食品甲醛檢測上有很大的應用潛力。
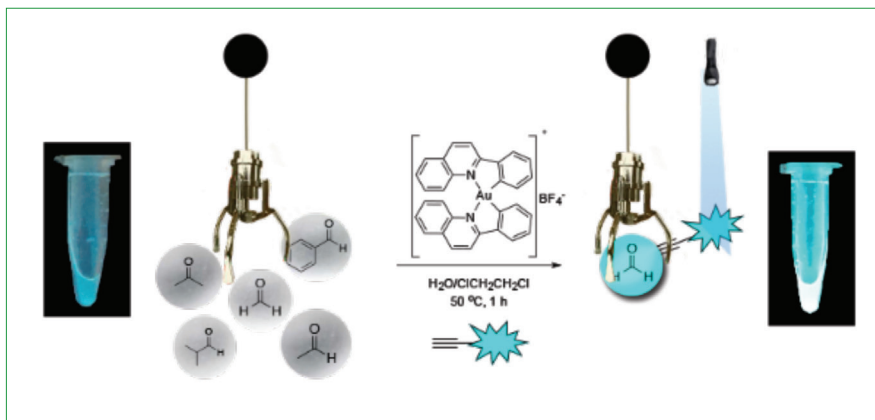
利用高選擇性的金(III)複合物三組分耦合反應的甲醛熒光視覺檢測方法
Visual fluorescent detection of formaldehyde by a highly selective gold(III) complex-mediated three component coupling reaction

1000 ppm   500 ppm   100 ppm   50 ppm   10 ppm   1 ppm   0 ppm

紫外光下的檢測結果
Test results under UV light

專利編號：CN104193672B (中國)

特色與優點

- 一種甲醛視覺檢測方法
- 無須昂貴儀器和高技術人員
- 檢測的化學反應快速
- 甲醛化學選擇性高
- 檢測結果能以液相層析-質譜法/ 質譜法分析，或目視分辨
- 可測驗複雜的反應混合物，適用於食品分析

應　　用

- 食品甲醛視覺檢測
- 配合相應的採樣器材，能檢測空氣中的甲醛

傳統分析方法 Traditional Instrumental Analysis Methods	基於熒光共振能量轉移的新檢測技術 FRET-Based Rapid Detection Technology
需要昂貴的分析儀器 Expensive analytical instrumentation	熒光探針設計簡單、成本低 Relatively inexpensive and simple fluorescent probes
樣品準備程序繁複 Tedious sample preparation	比率測量式傳感器 Ratiometric sensors
分析時間長 Time-consuming analysis	高敏感度和選擇性 High sensitivity and selectivity
分析結果容易受雜質干擾 Interference with irrelevant substances	適用於快速測試套件 Suitable for rapid detection kits development
不適用於現場食品安全測驗和前線品質管理 Not fit for on-site food safety inspection and front-line quality control	是現場食品安全測驗和前線品質管理的理想方案 Ideal for on-site food safety inspection and front-line quality control

比較傳統分析法和新式快速測試法
Comparison of traditional instrumental analysis methods and the novel rapid detection technology

Patent No: CN104193672B (China)

Special Features and Advantages

- A visual detection method for formaldehyde
- No expensive instruments and sophisticated operational skills are required
- Fast reaction time
- Exclusive formaldehyde selectivity
- Signal readout can be achieved by using LC–MS/MS analysis or naked eyes
- Excellent tolerance in complex reaction mixtures amenable for food analysis

Applications

- A visual detection method for formaldehyde in food
- Coupled with sample collection equipment, applicable for detection of formaldehyde in air

Formaldehyde in food has aroused health concerns in general public. To protect public health, governments and worldwide health organizations have established regulations and guidelines on it. However, formaldehyde has been illegally added to food for preservation and bleaching. Gas chromatography and liquid chromatography are typical analytical methods for formaldehyde measurement, but they require expensive instruments and sophisticated operational skills that are not suitable for on-site detection. In collaboration with Guangdong Entry-Exit Inspection and Quarantine Bureau (GDCIQ) of China, PolyU's fluorescent probes test is the first visual detection method for formaldehyde with excellent selectivity via a gold(III) complex-mediated three-component coupling reaction of resin-linked sterically bulky amines and fluorescent alkynes. This opens up a new direction for the development of rapid on-site detection of formaldehyde with diverse applications.

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