碳量子點毒品檢測試劑和試紙

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市場及需求:
藥品濫用是全世界關心的議題。雖然市場上已有一些檢測濫用藥物之試劑，但對新興濫用毒（藥）品目前仍無好的檢測方法，導致查緝機關抓不勝抓，防不勝防。因此，開發可供查緝單位在犯罪現場於第一時間判斷是否有毒品濫用的新型毒品檢感器或檢測試劑仍有其重要性。

技術摘要(含成果):
本發明揭示可檢測毒品之碳量子點溶液和修飾碳量子點試紙，並以檢測海洛因、古柯鹼及卡西酮等為實例。檢測原理為，具螢光之碳量子點與分析物(濫用藥物，如卡西酮)反應後會造成螢光淬息，且淬息比率和分析物濃度有關，故可藉由應光變化得知分析物之濃度。

優勢:
本發明之碳量子點溶液及檢測試紙具備靈敏、專一性、穩定、低成本等優勢，故極具濫用藥物檢測市場吸引力。

競爭產品:
目前市面上毒品檢測試劑（紙）係以免疫法檢測為主流，但其成本高且較不穩定。最重要的是，目前市場尚無可檢測卡西酮的試劑和試紙。

專利現況:
本發明目前已進入中華民國及美國專利案件的申請階段。本研究團隊具有數十年研究經驗，著力於開發新穎且綠色的奈米材料合成方法，特別是在碳量子點的領域。本實驗室領先全球提出利用小分子與咖啡渣等做為起始物製備碳量子點之概念，已經被廣泛的應用。本團隊研究成果具體表現，包含於國際期刊發表超過 310 篇論文和積極參與許多國際合作案等。

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Carbon dot solution and paper-based device for sensing of abused drugs

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Experience:

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Market Needs:

Drug abuse is a serious problem all around the world. Although there are some commercial assays for detection of some popular drugs, lack of assays for detection of new drugs has put great pressure onto law enforcement to deal with drug abuses and criminal. It is thus highly demanded to develop sensitive and on-field assays and reagents for detection of newly prepared drugs, which shall assist law enforcement officers to determine whether illegal drugs were used on crime sites.

Our Technology:

In this invention, we disclose use of carbon dots solutions and carbon dots functionalized papers for the detection of abused drugs, including heroin, cocaine, and 4-chloro-ethylcathinone. The carbon dot solution was used to prepare carbon dots functionalized papers. The sensing mechanism is based on analyte (abused drugs like 4-chloro-ethylcathinone) induced fluorescence quenching of carbon dots, and the quenching efficiency is proportional to the concentration of analyte. Thus, we can use the fluorescence change to determine the concentration of analyte.

Strength:

The disclosed carbon dot solution and carbon dots functionalized papers are sensitive, selective, stable, and inexpensive, leading to great commercial potential for the detection of abused drugs.

Competing Products:

Although there are some immune-based assays for the detection of abused drugs, they are expensive and have short shelf-life. More importantly, there is no commercial product for the detection of 4-chloro-ethylcathione.

Intellectual Properties:

This invention is under the patent application in ROC and US now. The Chang's group has involved in development of novel and green approaches to preparation of nanomaterials, especially carbon dots, for more than a decade. The hydrothermal route developed in this lab for preparation of carbon dots from various organic precursors such as small organic compounds and coffee powders has been well recognized. The Chang's group has strong connection with several international research teams and has published more than 310 papers in international journals.

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