



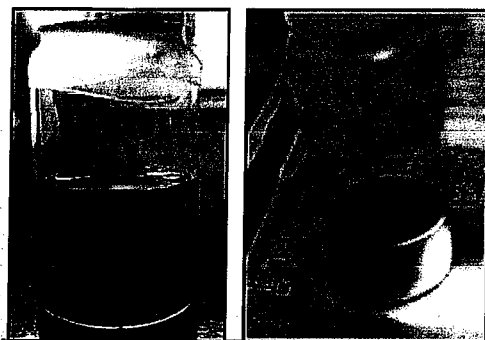
一種可發出紅至近紅外光之厚殼層無毒性磷化銦量子點

提案人：劉如熹 教授

單位：國立臺灣大學 化學系/研究所

簡歷：(可列出相關連結，例如系所、研究室網頁)

<https://www.ch.ntu.edu.tw/member/faculty/rsliu/>



市場及需求：

1. 環保意識高漲，目前更提出環境友善之無鎘磷化銦量子點，逐漸取代現有高毒性之含鎘 (Cd) 量子點。
2. 與傳統有機染料相比，量子點具有光學優勢，如高量子場、良好光穩定性且可反覆激發。
3. 紅光到近紅外光螢光發射之 InP 量子點可以在組織中實現其最大穿透深度。

技術摘要(含成果)：

該專利中，我們嘗試合成高生物相容性之磷化銦量子點並調整其粒徑以調節發射波長。該量子點將塗布上一層鋅硒硫化物與一層硫化鋅，形成核-殼-殼結構，以提高其量子效率。這種無鎘之 InP/ZnSeS/ZnS 多殼量子點可克服可見光放光之光學限制。透過電致發光過程應用於有機發光二極體之製備。相信該量子點可在未來生物醫學和發光二極體封裝之應用中持續地發揚光大。

優勢：

該量子點可以是一種新型無機染料，以紅色/近紅外螢光檢測生物環境變化。此外，紅色/近紅外螢光發光之磷化銦量子點也可封裝成有機發光二極體。磷化銦量子點具有非常寬廣之色域，高穩定性與高量子效率。

競爭產品：

各種診斷方法皆有其適用之範疇，舉例來說超音波影像擅長對於結構上的分析診斷，而像是光學診斷方式就比較適合對於組織或是單個細胞進行空間解析。為能提升早期診斷腫瘤之能力與更精準區分癌細胞與正常細胞之邊界，如何有效整合各式生物成像技術為目前主要之發展趨勢。

專利現況：

劉教授與其實驗室擅長無機奈米材料合成技術。對於材料合成與其物理和化學性質之相關研究已有數十年，現開發之無鎘 InP/ZnSeS/ZnS 量子點可以被識別並於優化生物影像應用。

聯絡方式(請不用填)：

臺大產學合作總中心

Tel: 02-3366-9945, E-mail: ntuciac@ntu.edu.tw



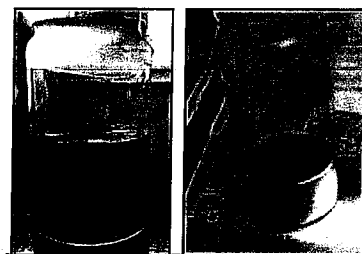
A thickness shell non-toxic InP quantum dots for red to near-infrared light emitting

PI : Prof. Ru-Shi Liu

Department of Chemistry, National Taiwan U.

Experience:

Website: <https://www.ch.ntu.edu.tw/member/faculty/rsliu/>



Market Needs:

1. Environmentally friendly, cadmium-free InP QDs can replace the toxic, cadmium-containing QDs.
2. Compared with traditional organic dye, QDs have optical advantages, such as high quantum field, good light stability, and repeatedly excited.
3. Red/NIR fluorescence InP QDs can achieve its maximum depth of tissue penetration.

Our Technology:

InP quantum dots (InP QDs) reveal optical, electrical, and magnetic properties that are distinct from traditional materials, and their properties can be controlled by particle size, which has brought many new applications in many fields. The red/NIR light-emitted InP QDs have great potential, and it is believed that it can be carried forward in the future application of biomedicine and light emitting diode (LED).

Strength:

QDs have high luminous efficiency and have the potential to replace traditional fluorescent dye. Currently, InP QDs have lower biotoxicity and can be better than traditional Cadmium (Cd) QDs in medical applications in the biological field. Red/near-infrared (NIR) light-emitted InP QDs have the best optical properties, can also be used to pack like a normal structure organic LED device.

Competing Products:

Considering factors such as sensitivity and spatial resolution, various diagnostic methods have their applicable scope. How to effectively integrate various biological imaging technologies is currently the main development trend.

Intellectual Properties:

Professor Liu and his laboratory specialize in the synthesis of inorganic nanomaterials for decades. The cadmium-free InP/ ZnSeS/ZnS quantum dots are now being identified and optimized for bioimage applications.

Contact (do not need to fill out):

Center for Industry-Academia Cooperation, NTU

Tel: 02-3366-9945, E-mail: ntuciac@ntu.edu.tw