



## 具備色彩辨識功能之聚對二甲苯鍍膜及前驅物

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**簡歷：**

台大化工系網頁：<http://www.che.ntu.edu.tw/che/?p=427&lang=en>

生物界面及先進醫材實驗室網頁：<http://wcb.che.ntu.edu.tw/biel/>

**市場及需求：**

生醫產業業界的幾個主要世界級大廠，如：Johnson & Johnson (美國)、Abbott (美國)、Boston Scientific (美國)等，都將聚對二甲苯的鍍膜技術視為一項重要的製程技術，其產品在市場上也已隨處可見。研發聚對二甲苯鍍膜技術以及販售鍍膜設備的業界龍頭，如：SCS (美國)、Uniglobe Kisco (美國)等，也致力於發展、推廣此鍍膜技術於生醫材料及裝置上的應用。因應許多同類型醫療器材極其相似且難以分辨，使用有色鍍膜包覆醫療器材可令使用者在操作時快速且正確地辨認、判別其使用方式與時機，並有效地幫助降低人為醫療疏失之機率。

**技術摘要(含成果)：**

本發明為一系列具備色彩辨識功能之生醫鍍膜的化學合成前驅物以及衍生物。五種前驅物原料藉由裝配含有富烯(fulvene)的衍生物，展現出強烈的黃色和紅色。以目前既有的官能化對二甲苯二聚體，透過不同製程之反應途徑製備這些具有不同官能基的鍍膜前驅物，並透過化學氣相沉積(CVD)聚合技術，在調控鍍膜設備系統參數後，將前驅物原料進行聚合，形成衍生物，產出高質量的有色生醫鍍膜。

**優勢：**

- (1) 其可被廣泛使用於各種生醫材料及元件上，色彩辨識功能能夠提供使用者，如：醫護人員、醫療器材工程師等人員，輕易辨別材料或裝置使用方式和時機的依據，如：順序、左右方位、旋性/掌性等方向性等，以幫助避免在大量、繁瑣的醫療行為下經常出現的人為失誤。
- (2) 聚對二甲苯具有優良的生物相容性(已通過美國FDA核准使用在某些醫療器材上，如：心臟支架、血袋、心律調整器)，並擁有非常良好的膜附着力，可應用於任何基材，如：金屬、陶瓷、玻璃、高分子，任何幾何形狀(2D、3D)之器材裝置，不受表面粗糙度影響。
- (3) 化學氣相沉積(CVD)製程，不需任何起始劑催化劑、塑化劑、溶劑，為乾式的乾淨製程。

**競爭產品：**

各式彩色鍍膜材料(如：VT Functional™ by Vapor Technologies, Inc.)。

**專利現況：**

- (1) 本技術已有相關專利 (中華民國專利申請號: I577656；美國專利證號: US9320835B2)。
- (2) 本研究團隊具有數十年研究經驗，主要致力於研究生醫材料表面各種生物功能的操控，包括研發先進氣相功能性高分子鍍膜之表面改質工程技術。

**聯絡方式(請不用填)：**

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## Color-coded Poly-*p*-xylene Coatings and Precursors

**PI :** Prof. Hsien-Yeh Chen  
Department of Chemical Engineering, NTU

An interesting **photo** related to your technology (be careful not to disclose)

**Experience:** NTU Chemical Engineering: <http://www.che.ntu.edu.tw/che/?p=427&lang=en>  
Biointerface and Biomaterials Engineering Lab: <http://web.che.ntu.edu.tw/biel/>

### Market Needs:

World leading providers of the biomedical industry, such as Johnson & Johnson, Abbott and Boston Scientific, have all acknowledged the significance of parylene coating as an indispensable industrial procedure. Major developers of parylene coating technology and devices, such as SGS and Uniglobe Kisco, have also been committed to promoting its application on biomedical products. Related products can now be found across the market. As medical devices of the same category can often be difficult to distinguish, the use of colored coatings can enable users to quickly and accurately identify each during operations, which can in turn help reduce the possibilities of medical malpractice.

### Our Technology:

Our invention is a group of precursors and derivatives of colored parylene. The five precursors are able to exhibit bright red and yellow colors after being combined with fulvene derivatives. Through different reaction pathways, precursors with distinct functional groups can be prepared from existing functionalized poly-*p*-xylene. They are then polymerized into varied high-quality medical coatings by adjusting the parameters of the chemical vapor deposition (CVD) process.

### Strengths:

- (1) This can be widely applied on all types of biomedical devices and instruments, providing color to similar products with contrasting characteristics, such as order of application, laterality, and rotation/chirality. This allows medical providers and engineers to easily distinguish one from another, decreasing the chances of human error during cumbersome medical procedures.
- (2) Parylene demonstrates exceptional biocompatibility, holding FDA approval for applications on several medical products, including coronary stents and cardiac pacemakers. Remarkable adhesion properties allow it to be applied on any type of base material of any shape, regardless of roughness.
- (3) CVD is a dry and green process that does not require any initiator, catalyst, plasticizer and solvent.

**Competing Products:** Colored coatings (e.g. VT Functional™ by Vapor Technologies, Inc.)

### Intellectual Properties:

- (1) There are related patents to be declared ().
- (2) With 10 years of research experience, our team aims to understand the manipulation of various biofactors on biomedical materials. Research and development of biointerface engineering technologies for advanced functionalized polymer coatings is one of our top priorities.

### Contact (do not need to fill out):

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