



## 肺腫瘤手術定位之水膠

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**簡歷：** <https://ntu-biomedical-polymer.weebly.com/about.html>

### 市場及需求:

台灣肺癌案件數以 1 萬 3000 件逐年增加中，全國每年約有 9000 人死於肺癌，無論是微創、開胸手術甚至是病理切片都須經由腫瘤定位後方可進行，隨著國人對癌症篩檢的意識提高，能夠準確定位、低風險且安全的定位工具是迫切被需要的。



### 技術摘要(含成果):

本產品以有機反應進行材料合成，並以氧化劑交聯，目前已完成材料原型設計、物理化學定性、細胞毒性測試以及肺破洞填補效果，並進一步與現行臨床定位用染劑進行體外組織定位模擬比較。初步結果顯示定位膠在與氧化劑混合後能於三分鐘內成膠並穩固地貼附在標記點，此時間長度符合胸腔外科醫師手術之需求；在爆破壓力測試中，經過材料填補的肺組織不僅壓力承受度提升，也不再具有漏氣現象；流變儀結果發現材料的黏彈性與豬肺相似，因此不會壓迫到正常組織；本案產品組成包含能夠去除自由基之酵素，因此 24 小時的細胞存活率可達到 80%，細胞型態也與控制組相同；產品於 24 小時後的定位效果明顯比 patent blue V 更明確且無擴散，因此綜合上述成果，本專利產品的表現符合臨床之需求。

### 優勢:

產品的顏色使其能夠直接肉眼辨識；與倒鉤金屬針相比，其氣胸及其他併發症的發生機率低，且不像倒鉤針有插入無法拔出之問題；以帶針針筒直接注射，操作方便，針造成的肺破洞能在材料擠出的同時來填補；一旦完成定位，無須擔心因時間拖延導致定位點模糊之狀況；不同於長倒鉤定位針，該產品定位後不會外露造成病患的壓力。

### 競爭產品:

定位長針(例: micro-coil 及 hook wire)及定位染劑(例: Patent Blue V 及 lipiodol)。

### 專利現況:

團隊長期以來一直以各式高分子材料設法解決不同的適應症，每個產品開發背後都有不同臨床醫師一同合作，因此產品的發展過程是絕對符合臨床需求也相當務實的。楊台鴻教授近年來努力將實驗室所開發之產品及技術申請專利並商品化，透過多方的產學合作關係期望將成果回饋於社會，目前已有台灣 13 件及美國 2 件之專利成果。(近期申請之相關專利為中華民國專利申請號: TW 109119984)

### 聯絡方式(請不用填):

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## Localizing Hydrogel for Operation of Lung Tumor

PI : Prof. Tai-Hong Young

Department of Biomedical Engineering, National Taiwan U.

**Experience:** <https://ntu-biomedical-polymer.weebly.com/about.html>

### Market Needs:

In Taiwan there are 13, 000 cases of lung cancer each year and growing year by year. This fatal cancer has taken 9, 000 lives per year. Pre-surgical localization is the essential procedure to video-assisted thoracic surgery of thoracotomy and even with specimen through biopsy. The increase awareness of the cancer screening requires accurate, precise, low-risk and safe localizing tool to help detecting cancers at early stage to greatly prevent death caused by cancer!



### Our Technology:

This product is synthesized by the reaction of organic chemistry and cross-linked by the oxidant. Our team has finished the design of prototype, characterization, cytotoxicity assay and in vitro model test; besides, in the comparison with clinically used localizing materials, Patent Blue V, had also been evaluated. We have successfully developed the localizing hydrogel that has suitable gelation time and be able to complement and stick to the lung surface firmly. The rheological properties of the product are similar to the porcine lung, which means the hydrogel won't hurt the normal lung tissue; the incorporation of enzyme, which can remove free radicals, makes the 80% of cell viability of this product after 24 hours. Finally, this localizing hydrogel shows the ideal localizing function, rather than like Patent Blue V that diffused randomly after 24 hours.

### Strength:

The intrinsic color of this hydrogel makes it easy to be identified by naked eyes. Different from the hook wire and micro-coil, the probability of pneumothorax is relatively low because the insertion point will be complemented once the hydrogel been injected, and the needle insertion point can be easily corrected if the position is wrong. Simple operation by the syringe capped with needle and no diffusion problem of this product that provide thoracic surgeon and patients a newly optimal material of lung tumor localization.

### Competing Products:

Long metallic localization needles, ex: micro-coil and hook wire, and tissue marking dye, ex: Patent Blue V and lipiodol.

### Intellectual Properties:

Each product made in our lab is contributed by our graduate students and corresponded doctors that we cooperate with, so the results must be practical and feasible to meet medical needs. Prof. Young has had 13 Taiwan patents and 2 U.S. patents so far and now he intends to create opportunities to bring both industry and academic cooperation to enhance better living to our society with manufacturing our products. (The most recent patent is in Taiwan: TW 109119984)

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

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