

課題番号 : F-16-HK-0007  
利用形態 : 機器利用  
利用課題名(日本語) :  
Program Title (English) : Fabrication of electrodes using stainless-steel pins for electrochemical detection  
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### 1. 概要(Summary)

This report describes the deposition of gold on to the heads of stainless-steel pins for new inexpensive fabrication of gold electrodes without photolithography for electrochemical detection. The head of a pin straightforwardly defines the active area of the electrode. The use of pins as materials of electrodes offers simple disposition of electrodes with a high versatility. Moreover, pins are inexpensive, disposable, available nearly worldwide, highly conductive, easily storable, electrochemically stable, and chemically modifiable with in a simple manner (e.g. dipping).

### 2. 実験(Experimental)

#### 【利用した主な装置】

EB 加熱・抵抗加熱蒸着装置(アルバック社製/EBX-8C)

#### 【実験方法】

Pins (nails) were cleaned by sonication in methyl alcohol for 15 minutes. The pins were perpendicularly attached to a holder and fix with a heat-resistant / polyimide-tape (Figure 1A). The holder was set in the evaporator and the deposition of Ti and Au was sequentially conducted at a rate of 1.5 nm/s up to a thickness of 100 nm each.

### 3. 結果と考察(Results and Discussion)

The quality of the Au layer was evaluated with pins having several types of heads (flat, round) with diameters from 1 to 4 mm. Figure 1B shows that polyimide tape was stable and retained the pins on the holder during the deposition. Figure 1C shows

that Au layers were successfully formed on the various types of heads of the pins.

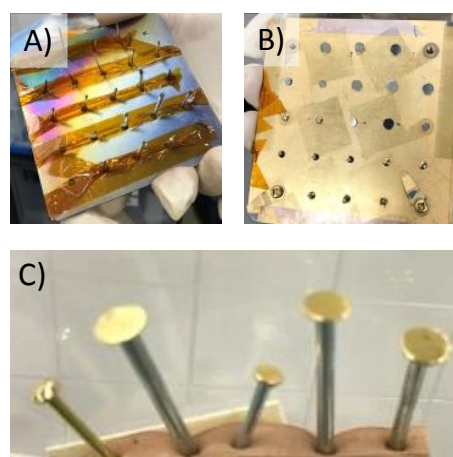


Figure 1. (A) The pins perpendicularly fixed to a holder with a polyimide tape for the deposition, (B) various types of pins with vacuum evaporated Au/Ti layer, (C) the gold layer formed on the top of pins.

In conclusion, we have developed a new deposition technique on commercially available pins, which offers electrodes for electrochemical device. The electrode fabricated by our technique is low-cost with reduced complexity of the fabrication, compared to existing electrodes integrated in miniaturized devices. This type of electrodes allows their flexible configuration. Therefore, the electrodes can be easily integrated and updated with other devices to fulfill various design.

### 4. その他・特記事項(Others)

N/A

### 5. 論文・学会発表(Publication/Presentation)

N/A

### 6. 関連特許(Patent)

N/A