アカデミックプログラム［B講演］ | 08. 触媒：口頭B講演

2024年3月19日(火) 15:55 ~ 16:35 A1457(14号館 [5階] 1457)

[A1457-2vn] 08. 触媒

座長：近藤 敏啓、清野 智史

日本語

15:55 ~ 16:15

[A1457-2vn-01]

放射線を利用した樹脂板へのPdナノ粒子固定化法のポリイミド樹脂への適用と無電解めっきへの応用

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英語

16:15 ~ 16:35

[A1457-2vn-03]

ステップ方向制御に向けたアニリン溶液浸漬によるTiO_2(110)単結晶表面の異方的エッチング

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英語

[A1457-2vn-02]

講演取り下げ

放射線を利用した樹脂板への Pd ナノ粒子固定化法のポリイミド樹脂への適用と無電解めっきへの応用

（阪大院工）○上垣 直人・清野 智史・佐藤 陸弥・石黒 文康・大久保 雄司・中川 貴
Immobilization of Pd nanoparticles on polymer substrates by the method using radiation applied to polyimide resins and its application to electroless plating (*Graduate School of Engineering, Osaka University*) ○Naoto Uegaki, Satoshi Seino, Rikuya Sato, Fumiyasu Ishiguro, Yuji Ohkubo, Takashi Nakagawa

Pd nanoparticles can be immobilized on various substrates by the method using radiation[1]. Electroless plating film was obtained by using immobilized Pd nanoparticles as catalysts. In this study, we examined its application to polyimide (PI) as substrate materials for flexible printed circuit boards. PI film was enclosed in aqueous solutions of Pd ion. The solution was irradiated and Pd nanoparticles were immobilized. The obtained samples were characterized by SEM, ICP-AES, XPS and so on. Figure 1 shows SEM image of prepared resin plate surface. It was observed that the Pd nanoparticles were immobilized on the PI film. The amount of Pd immobilized on the PI film surface was 54 ng-Pd/mm^2-PI, which was comparable to that of ABS used as the polymer substrates. In addition, the immobilized Pd nanoparticles showed activity as an electroless plating catalyst. The relationship between the surface morphology and chemical state of the obtained samples and the adhesion of the plating film were discussed.

Keywords : Radiation, Nanoparticles, Polyimide, Electroless Plating

放射線を利用した手法により、Pd ナノ粒子を様々な樹脂基板に固定化できることが報告されている[1]。既往研究では ABS 樹脂においては固定化した Pd ナノ粒子を触媒として、密着性の高い無電解めっき膜が得られている。本研究ではフレキシブルプリント配線板の基板材料に用いられているポリイミド（PI）樹脂への適用を検討した。Pd イオン水溶液に浸漬した PI フィルムに放射線を照射し、Pd ナノ粒子を固定化した。得られた試料は SEM、ICP-AES、XPS などで分析した。得られた試料表面の SEM 像を Figure 1 に示す。PI フィルム上に Pd ナノ粒子が固定化されている様子が観察された。PI フィルム表面の Pd 担持量は 54 ng-Pd/mm^2-PI であり、樹脂基材として ABS 樹脂を用いた場合と同程度であった。また、固定化した Pd ナノ粒子は無電解めっき触媒として活性を示した。得られた試料の表面形状および化学結合状態とめっき膜の密着性との関係について議論する。

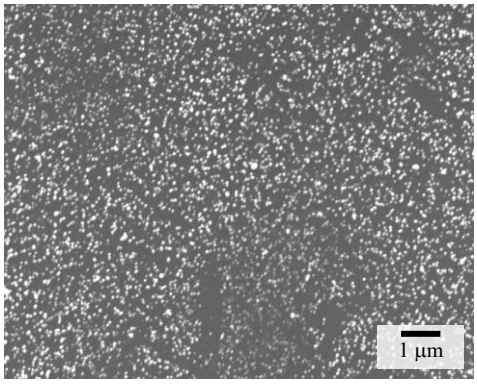

Figure 1. SEM image of prepared Pd nanoparticles on PI film.

1) N. Uegaki et al., *Nanomaterials.* **2022**, *12*, 4106.

Anisotropic Etching of TiO_2(110) Single-Crystal Surface with Aniline Solution Immersion for Step Direction Control

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Keywords: Aniline (AN); TiO_2(110) Single-Crystal Surface; Solution Immersion; Step direction control; Photocatalytic reaction

TiO_2(110) single-crystal surface have been used as a model surface for photocatalytic reactions. It is important to control of a step direction on TiO_2(110) surface because photocatalytic reactions depend on the step direction. However, there are few reports to control. In this study, we found TiO_2(110) surface was etched and a uniform step structure in the [001] direction formed after immersing of the clean TiO_2(110) single-crystal substrate in an ethanol solution containing aniline.

It is known that AN is uniformly adsorbed on the TiO_2(110) surface when it was vacuum deposited. However, AN was not adsorbed on the TiO_2(110) surface from the solution. Nevertheless, its surface morphology was significantly different before and after the immersion into the ethanol solution containing AN (Fig. 1). Zigzag steps in the $[\bar{1}12]$ direction with many kinks were observed in the sample prepared by immersion into the solution without AN (sample Et), whereas linear $[001]$ direction steps were observed when the sample was immersed in the solution containing AN (sample AN). Since Ti was detected in the solution after immersion, it was concluded that the etching was promoted by the formation of TiO_2-AN complex and its desorption as a result of adsorption of AN to step edged Ti.

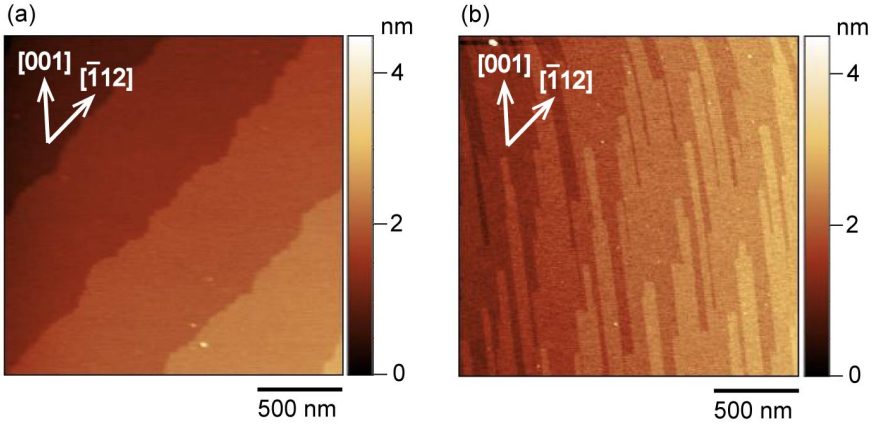

Figure 1 AFM images of (a) sample Et and (b) sample AN (2 μm × 2 μm) [1)].

1) M. Takahari, T. Goto, S. Yoshimoto, T. Kondo, *Chem. Lett.* **2023**, *52*, 823.