

課題番号 : F-21-NU-0070  
利用形態 : 機器利用  
利用課題名(日本語) :  
Program Title (English) : Electrochemical CO<sub>2</sub> Reduction  
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キーワード/Keyword : Metal deposition, Surface oxidization, 形状・形態観察, electrocatalyst, CO<sub>2</sub> reduction

### 1. 概要(Summary)

This research proposes to increase the reaction rate (as faradic efficiency) of CO<sub>2</sub> reduction reaction (CO<sub>2</sub>RR) by using the electrochemical reduction technology with a well-designed nanostructure electrocatalyst. Cu-based catalysts have been widely used as effective CO<sub>2</sub> reduction. However, the Cu catalyst must be modified to improve active site by deposition metal oxide.

### 2. 実験(Experimental)

#### 【利用した主な装置】

走査型電子顕微鏡

#### 【実験方法】

The copper foam (2x2 cm<sup>2</sup>) was oxidized by applied current 80mA under alkaline solution. To in-situ grow copper nanowires directly on copper foam substrate. The obtained as Cu nanowires (Cu NWS)/CF.

Then, growing In and Zn metal on Cu nanowire/Cu foam via pulse-electrodeposition. Finally, the In-Cu/CF and ZnCu/CF were calcinated under 300 °C for 1hour at the air atmosphere.

### 3. 結果と考察(Results and Discussion)

The fabrication of Indium (In) and Zinc (Zn) catalysts based on Cu foam substrates were synthesized via pulse electrodeposition, which is expected to be beneficial for the uniformly depositing of metal on the surface of substrate.

The morphology (Fig. 1A) of Cu NWS/CF shows

nanowires structure in-situ growing on Cu foam substrate. However, The Cu nanowires were decomposed by deposition In and Zn metal (Fig. 1B and 1C). Therefore, the obtained In-Cu/CF and ZnCu/CF have a morphology with typical nanoparticles and nanoflakes, respectively, which are homogeneously grown along the surface on the Cu foam substrate.

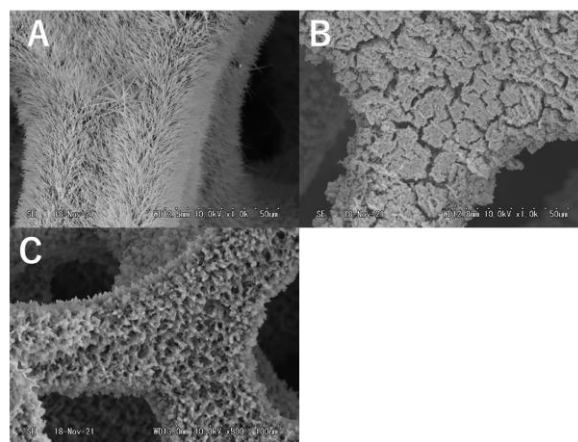


Fig. 1 SEM images of (A) Cu nanowires (Cu NWS)/CF, (B) In-Cu/CF and (C) ZnCu/CF.

### 4. その他・特記事項(Others)

なし。

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

なし。

### 6. 関連特許(Patent)

なし。