

Fabrication of 3-D Micromesh Ni Structures Using Electroplating

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Summary

This paper presents fabrication method of a 3-D micromesh Ni electrode. Inverse-micromesh photoresist structures, fabricated by multiple inclined backside exposure, were used as a mold for Ni electroplating. Ni meshes of about $3\mu\text{m}$ in diameter were obtained by this method.

Fabrication process

The fabrication method of a 3-D photoresist of SU-8 micromesh structure was already reported [1][2]. Considering bio-chemical applications, metal micromesh structures are required in many cases. Micromesh electrodes have advantages on electrochemical sensing because of its large surface area. For these reasons, we progress SU-8 mesh fabrication method to realize 3-D micromesh metal structures. Fig.1 shows process sequences of the 3-D micromesh Ni electrode. Cr/Au layer is patterned on a glass substrate and LA900 (positive resist) is spin-coated (Fig.1 (a)). Cr and Au layer are used as a mask and an electroplating seed layer respectively. After multiple inclined UV exposure from backside (Fig.1 (b)), LA900 is developed, as a result, inverse-micromesh structure is formed (Fig.1 (c)). Ni is electroplated using this inverse-mesh structure (Fig.1 (d)). Finally, LA900 is removed and 3-D micromesh Ni structure is obtained (Fig.1 (e)).

Results

In order to apply electroplating, we used ring-shaped Au seed layer as shown in Fig.2. To fabricate inverse-mesh structure, LA900 near the each Cr/Au openings was over exposed, since UV light should pass through Cr/Au openings two times. As a result, ring-shaped Au appeared around the opening (Fig.2). Ni was electroplated using this ring-shaped Au seed layer. Fig.3 shows SEM micrograph of an electroplated Ni structure. Diameter of the inclined micropillar is about $3\mu\text{m}$. It is indicated that ring-shaped Au can be used as a seed layer for electroplating.

Acknowledgements

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References

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- [2] H. Sato, et al., "SU-8 MICROMESH ARRAY STRUCTURE $2\mu\text{m}$ PORE SIZE FOR BIO/CHEMICAL MICROSYSTEMS", 205th ECS, 918.

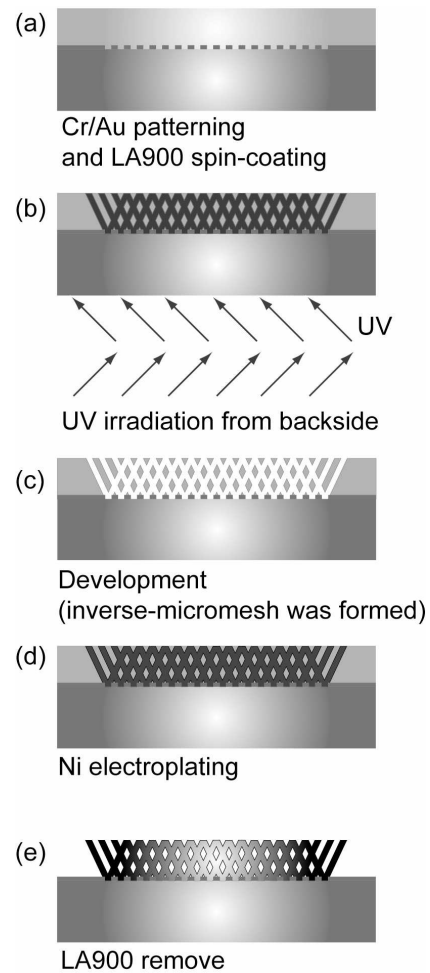


Fig.1: Fabrication process of a 3-D micromesh Ni electrode.

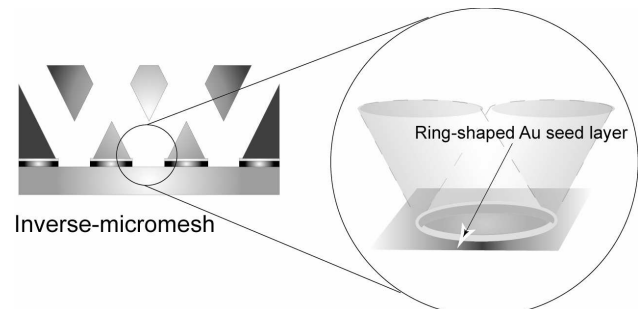


Fig.2: Ring-shaped Au seed layer for electroplating.

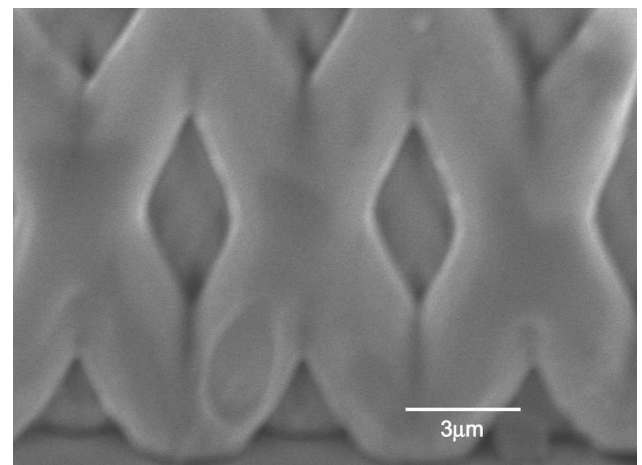


Fig.3: SEM micrograph of an electroplated Ni structure.