課題番号　:F-18-RO-0009
利用形態　:技術代行
利用課題名（日本語）　:金属テストパターンによる高空間分解能光電子分光装置の分解能評価
Program Title (English)　:Spatial precision of micro focused Laser-based photoelectron spectroscopy
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キーワード／Keyword　:spatial resolution, photoelectron spectroscopy, 膜加工・エッチング

1. 概要（Summary）

The goal of this project was the fabrication of a micron sized reference pattern and using it to subsequently test the reproducibility and precision of newly developed measurement techniques at the μ-LaserARPES machine at the Hiroshima Synchrotron Radiation Center (HiSOR). The so called "scanning" mode enhances the spatial resolution while rastering the sample surface with the photon beam, the "tracing" mode increases the spatial precision during rotations of samples.

2. 実験（Experimental）

【利用した主な装置】

レイアウト設計ツール、マスクレス露光装置、走査電子顕微鏡（SEM）、真空蒸着装置

【実験方法】

A fabrication process of the metal test pattern is shown in Fig. 1. Metal patterns are fabricated by lift off method. Firstly, pattern design for lithography was prepared with the layout editor tool, and photoresist (ZPN-1150-90) patterns for lift off process were formed on a silicon wafer by Maskless lithography system. Next, Sb/Au stack layer was deposited on the photoresist pattern by vacuum evaporation system. Finally, large area unnecessary metal film were peeled with tape, and photoresist was dissolved with acetone. The fabricated sample is shown in Fig. 2.

The μ-LaserARPES at HiSOR is equipped with a focusing system that allows for Laser spot sizes as small as ~4 μm and a sub-μm precision manipulator.

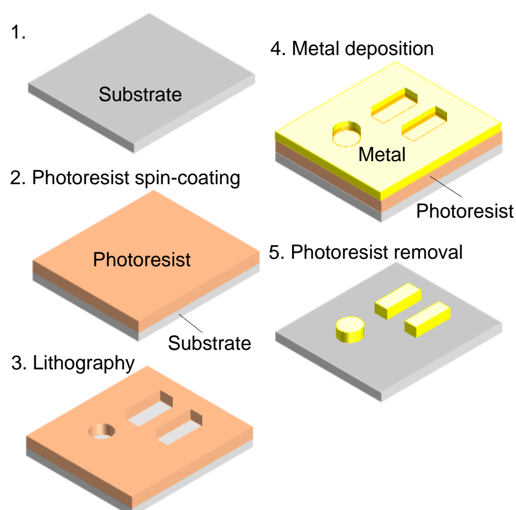

Fig. 1. Fabrication process of the sample.

3. 結果と考察（Results and Discussion）

Au line patterns with a width of 3, 5, 10, 50,100 and 250 um have been fabricated in 5 mm square chips by the above experiment method as shown in Fig. 2. We will test the reproducibility and precision of the new measurement technique using the fabricated reference samples in the future.

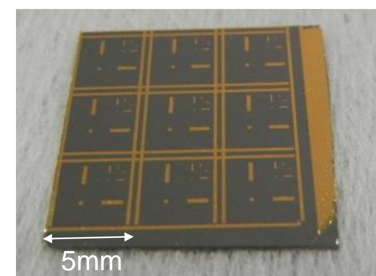

Fig.2. Photograph of fabricated sample

4. その他・特記事項（Others）

none

5. 論文・学会発表（Publication/Presentation）

none

6. 関連特許（Patent）

none