1. 概要（Summary）

The goal is to nanopattern large area surface (few cm2) using e-beam lithography and standard etching technique to obtain nanopillars or nanocavities in Si wafer. These nanostructures will then be investigated for optical applications.

2. 実験（Experimental）

【利用した主な装置】Apparatus

高速大面積電子線描画装置 ADVANTEST F7000S-VD01

汎用 ICP エッチング装置　　ULVAC CE-300I

形状評価装置　　　　　　　Dektak XT-S

電子顕微鏡　　　　　　　　Hitachi S-4700

【実験方法】Process used:

- Si wafer cleaning (acetone, ethanol, DI water + HF)
- Adhesion promoter and negative resin spin coating + postbake curing
- E-beam exposure + postbake
- Resin development + postbake
- Resin/Si etching to transfer pattern into Si wafer
- Si mold cleaning (O2 etching + piranha solution)

3. 結果と考察（Results and Discussion）

Nanopillars with several heights and diameters have been obtained by playing with exposure dose as well as CF4 etching time. It should be mentioned that the negative resin TOK OEBR-CAN028T2PE 2.2cPs does not give reproducible nor satisfactory spin coating quality. Lots of defects and comets could be found resulting in defects in the final Si nanopillars structure. Usage of high spinning speed and higher viscosity such as the 3.1cPs resin give better results.

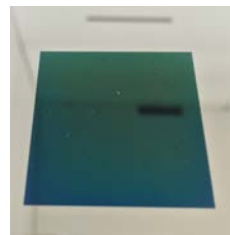Figure 1 shows picture of large area nanopatterning with defects.

Figure 1. 3 cmx3 cm fabricated Si nanopillars wafer containing defects (non patterned part)

Figure 2 shows FE-SEM images of fabricated nanopillars. An unexpected high roughness was found and pillar top seem to present a concave feature.
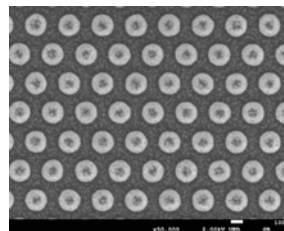

Figure 2. FE-SEM images of fabricated nanopillars presenting a unexpected high roughness and pillar top

4. その他・特記事項（Others）

5. 論文・学会発表（Publication/Presentation）

None

6. 関連特許（Patent）

None