[III-18]

Fabrication of Micronsize Volcano-type Field Emission Tip using Proximity Printing

S.W. Choi, Mi-young Jung[1], J.K. Jeon, Seong. S. Choi

Sun Moon University, Ahsan, Chungnam, 336-840

The volcano-type field-emission tip arrays have been fabricated on the silicon substrate using proximity pattern printing. ~3000Å silicon dioxide was thermally grown for etching and patterning tip-masks and followed by the positive photoresist coating. The alignment gap between the mask and the sample was adjusted to 10μm. Upon 9 seconds exposure of the ultra violet lights with combinations of g-line (435nm), h-line(405nm), and i-line(365nm), the donut-type ring patterns dependent on the mask pattern size were observed on the sample. The inner diameters of the ring after the exposure are found to be dependent upon the gap between the mask and the sample, the size of the mask pattern, and the exposure time. For the diameters greater than 2.5μm, the ring pattern phenoemena have not been observed. The inner diameter of the ring pattern for 1.4μm mask pattern is found to be ~ 1.25μm, while the outside of the diameter is found to be ~2.5μm by scanning electron microscopy(SEM)(Fig.1).

The anisotropic reactive ion etching(RIE) procedure were performed using a SF_6. The inner-diameter of the volcano-type tip was found to be ~1μm(Fig.2). The diamondlike carbon film (DLC) will be deposited on top of the fabricated tip arrays and its field emission characteristics will be investigated.

1: present affiliation:

Research Center for Atomic Scale Surface Science, Yonsei Univeristy, Mapo-ku, Seoul, Korea

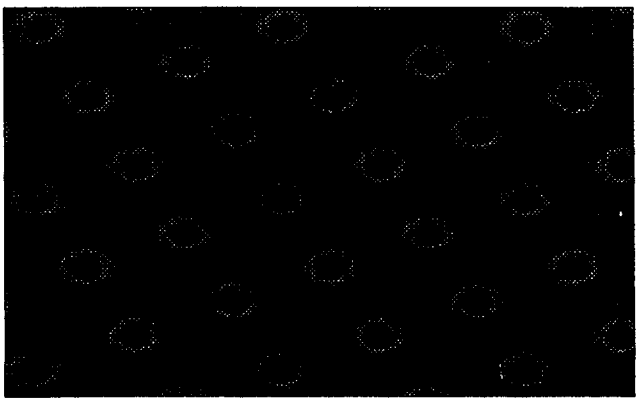

Figure.1 The ring shape of the tip mask(1.4 μm) upon the UV exposure and PR stripping. The inner diameter of the etched area was found to be ~1.25 μm by SEM, while outer diameter of the ring shape was approximately 2.5 μm.

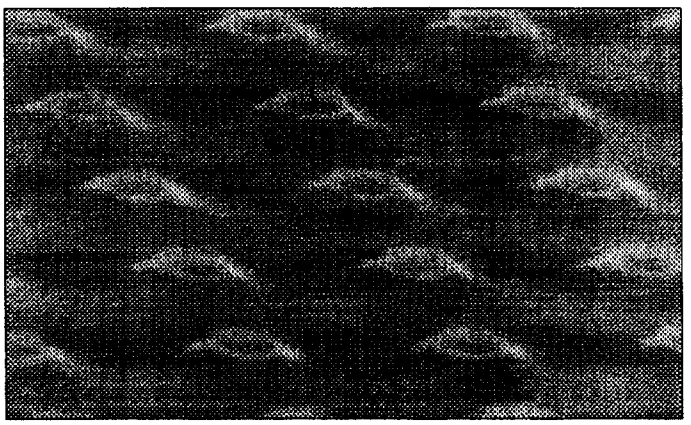

Figure.2 The volcano-type tip arrays with ~1.1 μm heights was seen by SEM.