

New Barrier Rib Formation Technology of PDP Using Silicone Rubber Mold Transferred from SU-8 Master Structure and UV-LIGA Process

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Introduction

PDP(plasma display panel) development has been rapid due to its excellent performance as a large flat panel display. A barrier-rib plays an important role in defining the brightness and resolution of PDP. As such, the development of barrier-rib structure with a high-aspect ratio has been a critical issue with the development of HDTV.^{[1]-[5]} In this paper, we suggest a new barrier-rib formation technique for PDP to obtain a barrier-rib with a high aspect ratio and reduce the manufacturing cost. This technique is a very simple and inexpensive method consisting of printing of barrier-rib paste, drying, pattern transferring and firing. This technique can produce the desired barrier-rib shapes with a high aspect ratio.

Experiment

In this study, we used an SU-8 50 photo-resist, which is sensitive to the UV, instead of PMMA to the x-ray irradiation so that the silicone rubber mold could be applicable to a large area PDP. This paper covers the technical details of using SU-8 photo-resist as it applies to the fabrication of a silicone soft mold for a PDP barrier-rib. Fabrication and pattern transferring process are shown in Fig 1 and Fig 2. Fig 1 shows the fabrication sequence of soft mold for PDP barrier rib with high aspect ratio and Fig 2 shows process for forming barrier rib structure using pattern transferring process and its merits.

Results & Discussion

Fabrication results about SU-8 master structure, structure, silicone rubber mold and barrier rib transferred from soft micro-mold are shown in Fig 3, Fig 4 and Fig 5. The new formation technology for a PDP barrier-rib structure using the soft micro mold transferred from the SU-8 master structure has several advantages:

1. Pattern-transferring method with soft micro mold is simple and quick, thereby resulting in a high throughput.
2. Desired barrier-rib shapes(box, meander and so on) with a high aspect ratio can be made using the soft micro mold fabricated by combining the SU-8 deep lithography and the silicone rubber injection.
3. The new formation technology can be easily applied to large panels, and the deviation among barrier-rib pitches on substrates is minimal.
4. Disadvantages of conventional mold-pressing methods with hard mold can be overcome

Reference

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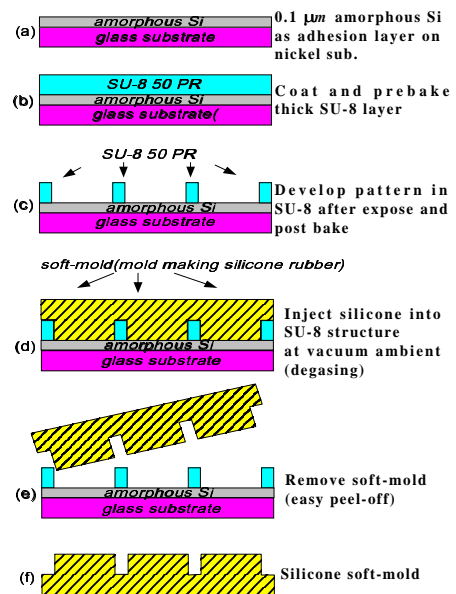


Fig 1. Fabrication process of soft mold for PDP barrier rib

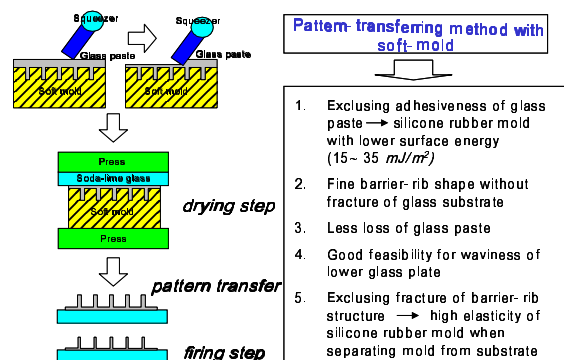


Fig 2. Schematic view of process for forming barrier rib structure using pattern transferring process and merits of soft mold

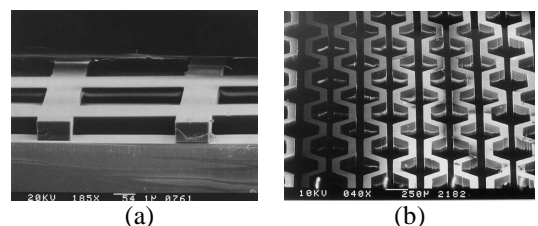


Fig 3. SEM views of SU-8 master structure, (a) box type(120 μm height), (b) meander type(250 μm height)

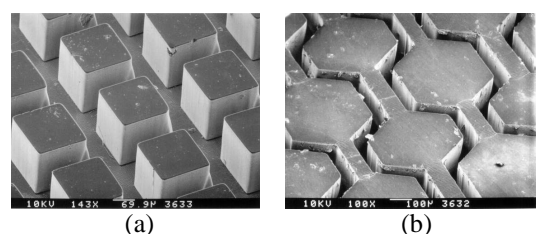


Fig 4. SEM views of silicone rubber mold, (a) box type(250 μm height), (b) meander type(250 μm height)

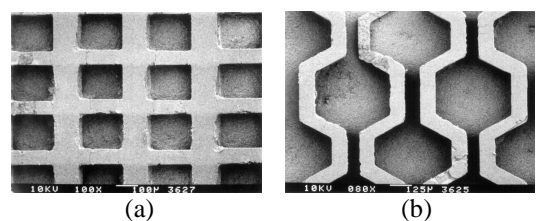


Fig 5. SEM views of barrier-rib transferred from soft micro mold. (a) box type(230 μm height), (b) meander type (230 μm height)