Abstract

In this study, we used electric currents to provide the driving force and investigated the effect of electromigration on the tin whisker growth. By the result, we found that the distribution of current density will influence the behavior of whisker growth.

The substrate used in this experiment was a p-type silicon wafer. Sputter was used to deposit a 1 μm copper film on the substrate. Then the lithography process was applied to define copper circuits. Afterward, the immersion tin was used to exchange the copper for tin. The thickness of the tin film was 1 μm. Three different widths of tin lines, 50 μm, 100 μm, and 200 μm, were designed on our sample. The current density ratio of high to low was 4：2：1. Two different testing currents and three different temperatures were employed in this study.

Tin whisker growth at high current density was more than the one at lower current density. The numbers of tin whiskers at 50 °C were more than that at 30 °C under stressing. Additionally, the tin whisker was not observed at 70 °C during current stress. Furthermore, whiskers were frequently observed on the locations where the current density changed, such as the corners or the junctions of different width lines. The distribution of the current density will decide the region of tin whisker occurred.