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Thermal Cycling Reliability of Bilayer Passivation Films in Plastic-Encapsulated Memory Devices

프라스틱으로 조립되는 반도체 제품에서 2층 구조 패시베이션 막질이 갖는 T/C 신뢰성

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The bilayered passivation films of oxide followed by silicon nitride were tested to study how the occurrence of passivation breaking during thermal cycling can be influenced by the manipulation of their topological feature or increase in their thickness. It was discovered that thickening of the silicon nitride film is generally effective for suppressing its susceptibility to thermomechanical damage because an increase in SiN thickness can allow to shift the maximum stress field (responsible for passivation damage) in order to avoid the local stress concentration. However, since the susceptibility of the rigid film such as SiN to thermal stress-related damage has a strong dependence on its proximity to the chip corner, the shear stress-driven damage potential of the SiN film with poor step coverage was high at the chip corner. So, the present work adopted the bilayered passivation including the oxide layer which leads to smoothing of the entire pattern by sloping metal sidewall. The thermal cycling test showed that thickening of such bilayered passivation was highly effective for the improvement of passivation reliability no matter where it is located on the chip.