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A study on the bonding conditions and mechanism for glass-to-glass anodic bonding in field emission display

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Abstract

Here we have investigated the bonding conditions and mechanism for glass-to-glass anodic bonding in indium-tin-oxide (ITO)-coated glass using an Al/Cr composite thin film as an interlayer prepared by RF magnetron sputtering. The experimental results show that the bond strength increases with increasing the bonding temperature, bonding voltage, and Al film thickness. The optimum experimental parameters in the anodic bonding were found to be an Al film thickness of 300 nm, bonding temperature of 300℃, and bonding voltage of 700 V. Oxygen content within the bonded interphase increases and aluminum content decreases on increasing both the temperature and voltage during the bonding process. According to EDS analysis results, the main bond mechanism is proposed to be due to the following chemical reactions:

$4Na^+ + 4e^- \rightarrow 4Na$, $xAl + yO^{2-} \rightarrow Al_x O_y + 6e^-$, $x = 2$, $y = 3$.

Key words: Anodic bonding;Field emission display;
Glass-to-glass;Spacer;Sputtering