

MERCURY-LAMPS ARRAY-PANEL FOR THE ANNEALING OF POLY-SI THIN FILMS

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Plasma enhanced chemical vapor deposition (PECVD) and crystallization of amorphous-Si (a-Si) by post-annealing are used in the formation of poly-Si films. In respect of a low-price glass plate as the substrate of flat panel display (FPD), the current issues of annealing systems are a good uniformity, a large area capability, and a low-temperature processing, and a fast annealing time. One of the challenging technologies is the xenon flash lamp (XFL) annealing.

The spectrum of Xe flash lamp has a wavelength range of 400-800 nm with peak at 450 nm. However, the absorption coefficient of a-Si film increases to be high as the wavelength of lamp-emission becomes shorter to be a few 100 nm, and it decreases rapidly with increasing wavelength^{1,2}.

The mercury lamp emits 254 nm and 187 nm with the high intensity through the plasma discharge of high efficiency.

In this experiment, the radiation intensity of 254 nm and 187 nm will be shown to be easily controllable in the operation of Hg-lamp. The feature of panel system is introduced in array of Hg-lamps. The glass tube of Hg-lamp is the aluminosilicate glass which has a high melting point enduring at high temperature. The external electrode Hg-lamp is 4 mm in outer diameter, 0.5 mm in thickness. The lamp can be made over 2 m in length for the large area capability. Gas compositions are rare gases with Hg in liquid phase. Rare gas pressure is a few tens of Torr. When the Hg-lamp panel of annealing system is used in the vacuum chamber, the efficiency of annealing will be discussed.

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2. I. Yudasaka and H. Ohshima, "Rapid thermal annealing technique for polycrystalline silicon thin-film transistors", Jpn. J. Appl. Phys. Part 1, Vol. 33, No. 3A, 1994, pp. 1256-1260.