

1975-85

Semiconductor History Museum of Japan

Improvement of photodiode for image sensor

(Sony, Hitachi, NEC, Toshiba)

~ Discrete Semiconductor/Others ~

Semiconductor History Museum of Japan says that Hagiwara invented Pinned Photodiode in 1975.

In 1975, Sony proposed using a PNP transistor as the photodetector [3]. By providing a P⁺ layer (emitter) for the light incident section, the sensor electrode that covers the entire light receiving surface of the photodiode can be eliminated to improve the light sensitivity greatly. It was a basic proposal for a pinned photodiode with a P⁺ layer on the surface of the light receiving part.

【3】 Y. Hagiwara, Japanese Patent JP1975—134985

Next, proposals were made separately by Hitachi and Sony to use the P⁺ layer as the substrate potential. In 1977, Hitachi presented a structure in which the high-concentration surface P⁺ layer is connected to a P-type substrate (well) and pinned it to the same potential as the substrate to increase the charge storage capacity and widen the dynamic range of the photodiode [4]. In 1978, Sony

【4】 N. Koike, I. Takemoto. Japanese Patent JP1977—837