# Invention and Historical Development Efforts of Pinned Buried Photodiode.

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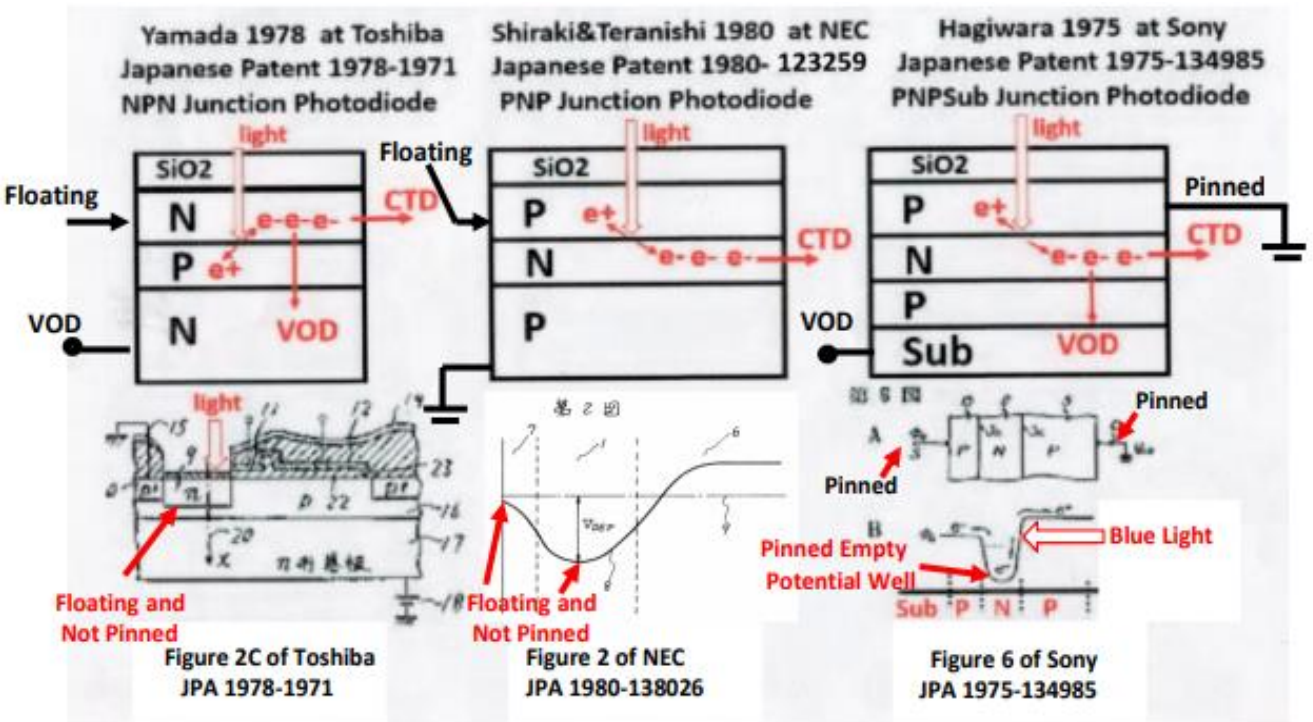
**JPA1975-127646, JPA1975-127647 and JPA1975-134986 are the evidence that Yoshiaki Hagiwara at Sony is the inventor of Pinned Buried Photodiode and the SSDM1978 paper by Hagiwara team in Sony is the evidence that Hagiwara developed the first Pinned Buried Photodiode with the no-image-lag feature, the low surface dark current and the excellent short-wave blue-light sensitivity.**

| Three important Features \ Three types of Photo Sensing Devices | 1<br>N+P Single Junction Photodiode with Floating N+ Surface | 2<br>Charge Couple Device CCD/MOS Dynamic Photo Capacitor | 3<br>P+NP Double Junction Dynamic Photo Transistor Pinned Buried Photodiode |
|---|---|---|---|
| 1 Image Lag Problem | Serious Image Lag Problem | No Image Lag Problem | No Image Lag Problem |
| 2 Surface Dark Current Noise | No Surface Dark Current Noise | Serious Surface Dark Current Noise | No Surface Dark Current Noise |
| 3 Short-Wave Light Sensitivity | Poor Short-Wave Light Sensitivity | Very Poor Short-Wave Light Sensitivity | Excellent Short-Wave Light Sensitivity |




Floating Surface N Charge Storage Region has the Serious Image Lag Problem

Floating Surface P Region and Floating N Charge Storage Region with Floating Empty Potential Well and the Serious Image Lag Problem

Pinned Surface N Region and the Pinned Empty Potential Well with Complete Charge Transfer and No Serious Image Lag Problem