Checkered White-RGB Color LOFIC CMOS Image Sensor

Shun Kawada, Shin Sakai, Yoshiaki Tashiro and Shigetoshi Sugawa

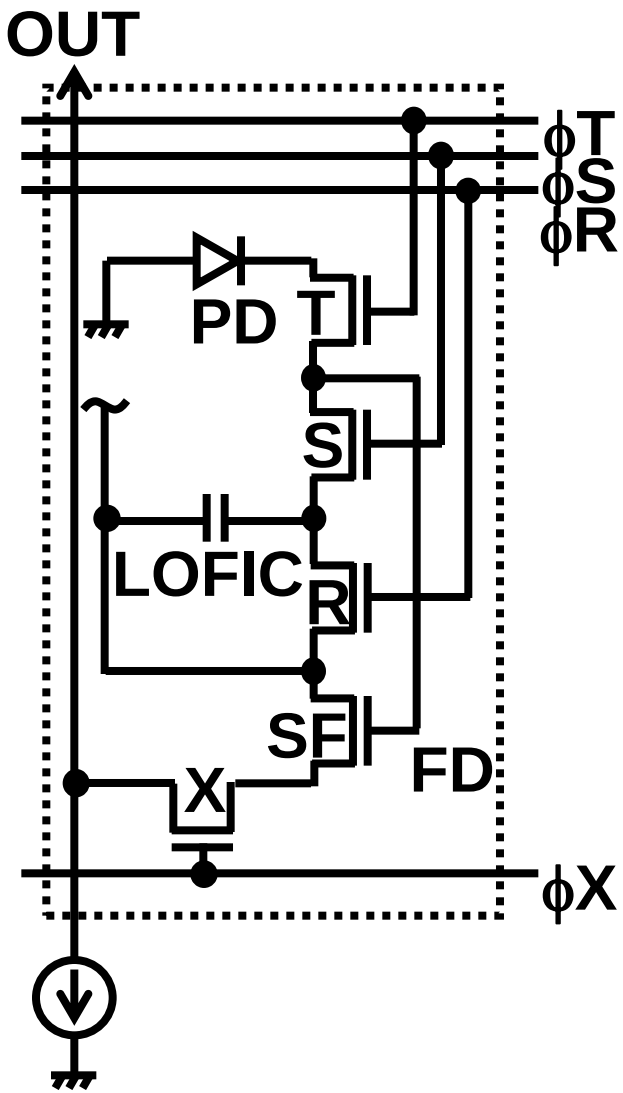
Tohoku University, Japan

Background

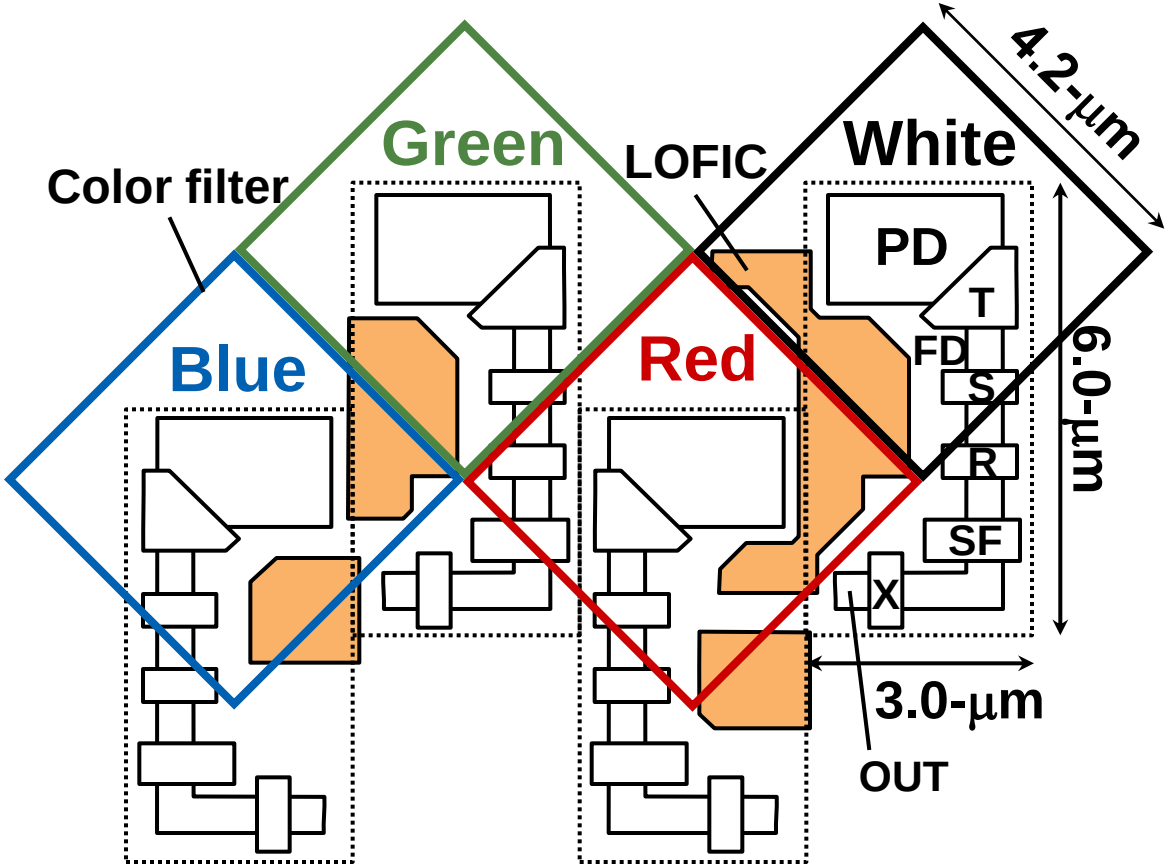
- **Requirements for high quality image**
  - **– High sensitivity.**
  - **– Wide dynamic range (DR).**
- **Conventional image sensors**
  - **– Photon loss at RGB color filter.**
  - **– 60 to 80dB DR due to tradeoff between DR and sensitivity.**

Device Structure

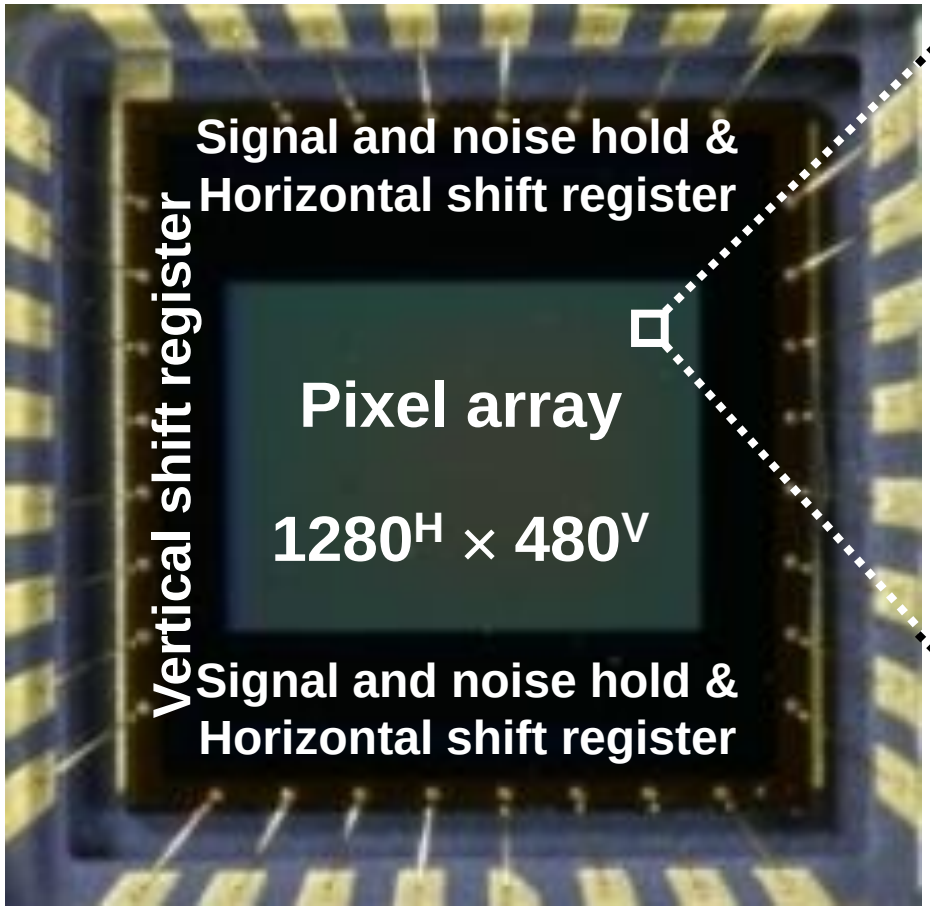
◆Pixel Circuit

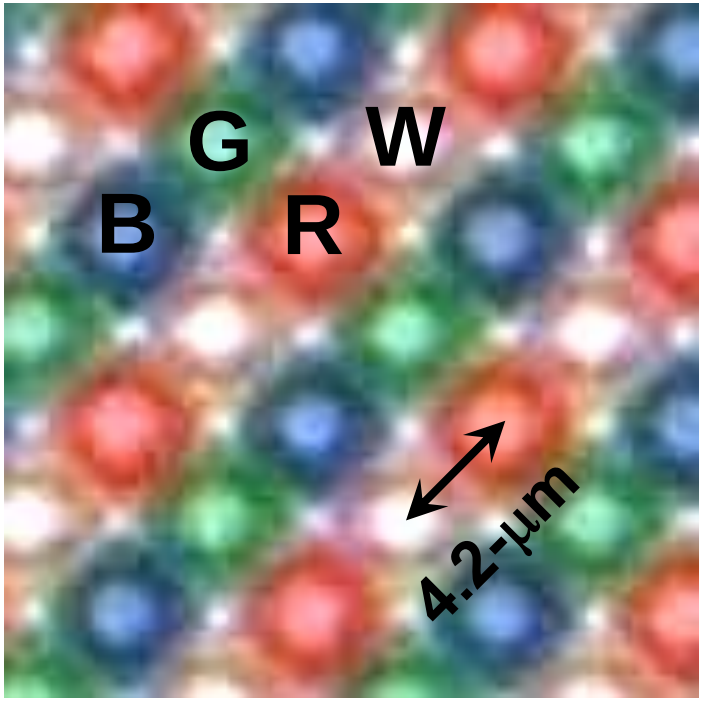


◆Pixel Layout



Chip Micrograph





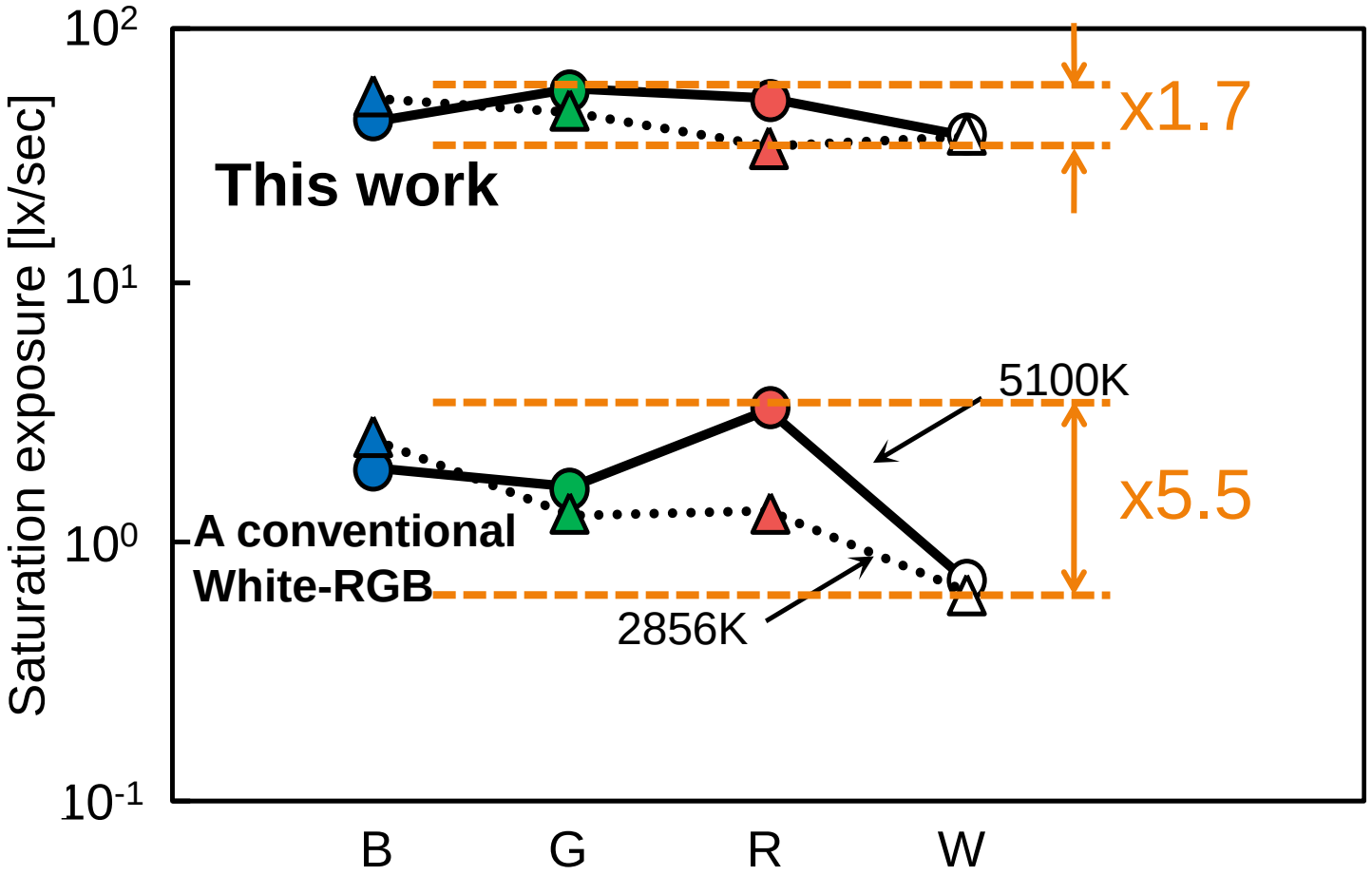
Die size = 5.6-mm^{H} × 5.8-mm^{V}

Fabricated through
0.18μm 2P3M CMOS technology
with buried PD process.

Saturation Exposure

◆Almost the same saturation exposure.

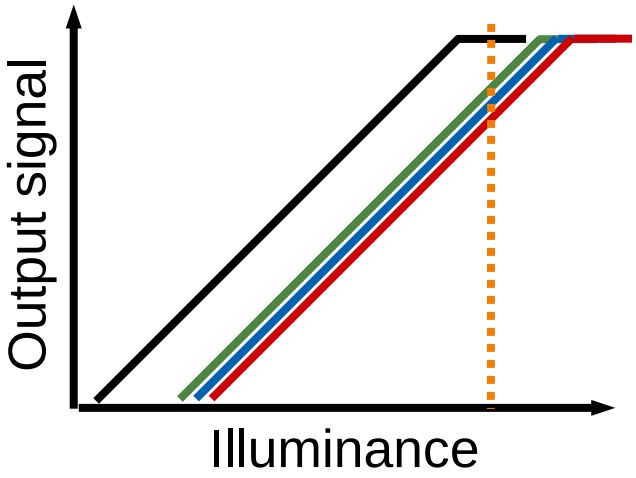
◆One digit higher saturation exposure than the conventional.

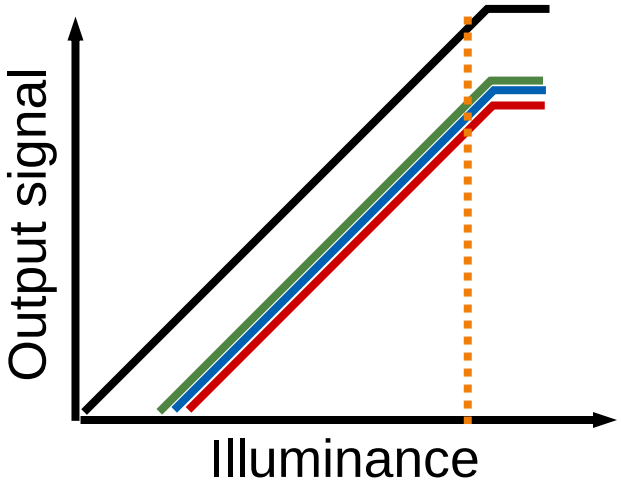


Sample Pictures

A conventional White-RGB

This work





Summary

- **This image sensor has achieved:**
  - **about two times higher sensitivity than the conventional RGB image sensor.**
  - **almost the same saturation exposure.**
  - **102 dB dynamic range.**