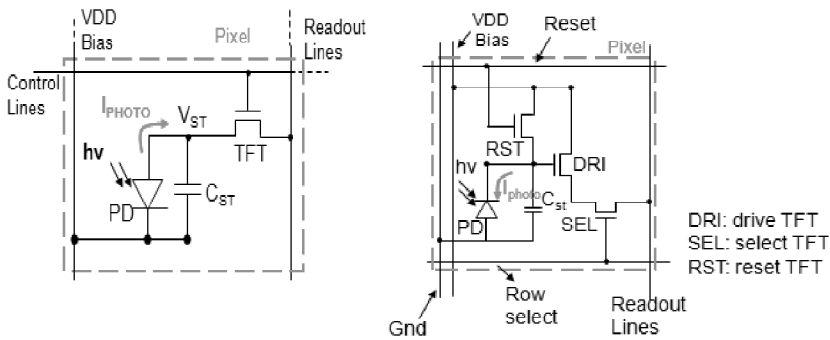


a-Si:H TFT Circuits for Imaging Systems

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(a) Passive pixel sensor (PPS) and (b) active pixel sensor (APS) circuits.

Imaging systems usually contain optical lens assembly and planar photo-sensing chips. Due to the limitation of the current processing technology today, imaging systems rely on chips built on the planar surface. This approach requires a complicated lens system and makes high-performance imaging systems rather bulky. By building bio-inspired receptor active-matrix arrays on a curved surface, we expect to achieve a large field-of-view, to avoid off-axis aberrations and declining illumination with increasing field-of-view angle due to the cos-law.

In this project, we investigated passive and active pixel sensor circuit designs based on different a-Si:H TFT structures developed in our group. We use HSPICE simulations to evaluate their electrical performance. An example of such simulation is shown for PPS integrated with charge integrating amplifier; its dynamic range is around 60dB for the photo-current ranging from 10^{-12} to 10^{-6} A. This project is supported by the Defense Advanced Research Projects Agency HARDI Program.

