CMOS vs CCD - the Basics

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Definitions

- *CCD: Charge Coupled Device*
- *CMOS: Complementary Metal Oxide Semiconductor*

CMOS vs CCD

- *Which one is superior to the other?*
  - *Depends on the job*
  - *Both have unique strengths and weaknesses*
  - *Both have evolved a lot in last years*

CCD - How it works?

- *Accumulate signal charge in each pixel proportional to the local illumination intensity*
  - *CCD transfers each pixel's charge packet sequentially to convert its charge to a voltage*

CMOS - How it works?

- *Accumulate signal charge in each pixel proportional to the local illumination intensity*
  - *CMOS, the charge-to-voltage conversion takes place in each pixel*

CMOS vs CCD

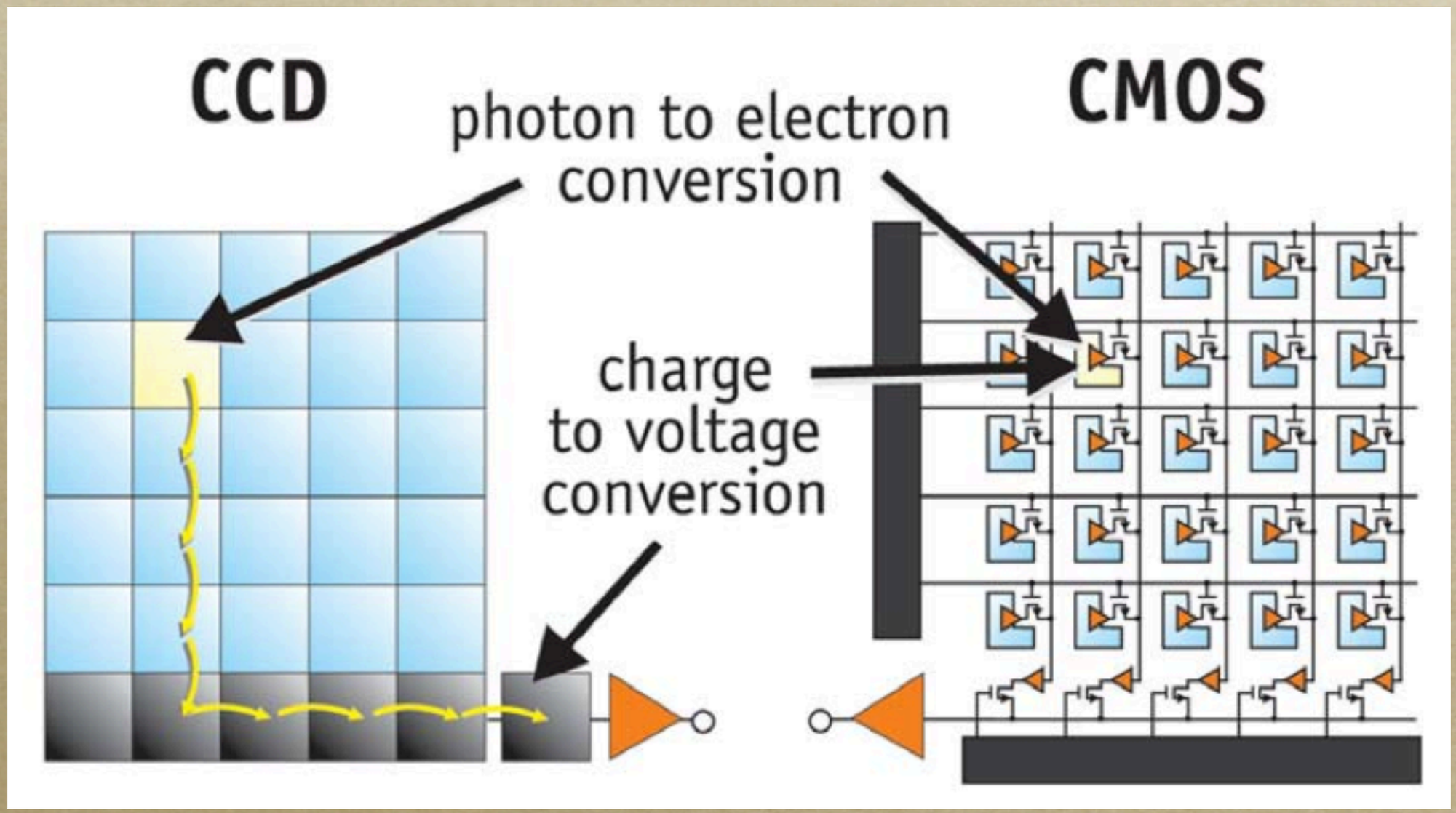

Image from Photonics Spectra

CMOS vs CCD

CMOS	*CCD*
◦ *Easier to manufacture*	◦ *Higher fill factor*
◦ *Camera-on-a-chip*	◦ *Smaller noise*
◦ *Lower power consumption*	◦ *Smaller dark current*
◦ *Smaller sensor*	◦ *Better pixel uniformity*
◦ *Higher speeds*	◦ *Better dynamic range*
◦ *Selective ROI windowing*	◦ *Non-rolling electronic shutter*
◦ *Natural anti-blooming*	

References

- *CCD vs. CMOS: Facts and Fiction*
  Photonics Spectra - January 2001
- *CCD vs. CMOS: Maturing Technologies, Maturing Markets*
  Photonics Spectra - August 2005
- *CCD vs. CMOS*
  Dalsa - http://www.dalsa.com/corp/markets/CCD_vs_CMOS.aspx

Thank you