Chips in the Cookie, Characterization of CCD Fabrication Anomalies for Use in Data Reduction

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CCDs are fabricated lithographically on one of several different substrates in a process flow of order of 250 different steps which can be broadly characterized as mask fabrication, epi fabrication, wafer fabrication, thinning, coating, dicing, and packaging. These steps randomly introduce specific types of anomalies into each CCD which show up later as a unique fingerprint of artifacts in data reduction. In a few of those cases, fabrication bakes the anomaly into the silicon in an invariant way. I will discuss a subset of these artifacts: photo response non-uniformity (PRNU), charge transfer efficiency (CTE), and fringing with the goal of understanding their root causes and characterizing them in a way that could statically inform the spectroscopy data reduction process. Specifically, I will discuss work we have done on characterizing mask alignment, charge traps, and active layer thickness, and the techniques we use to collect those measurements. For science grade sensors, we ultimately want to supply sensors with usable data not just datasheets reporting global averages.