Charge-integrating hybrid pixel array detectors for x-ray science and electron microscopy

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Electron microscopes and synchrotron x-ray light sources are powerful tools for probing the nature of matter down to the atomic scale. In order to extract the maximum benefit from these tools, detector development must keep pace with advances in source capabilities and experimental techniques. This has spurred the growth of a worldwide detector community with efforts focusing on various aspects of detector design, ranging from detector characteristics such as dynamic range and readout speed to the design and characterization of novel sensor materials.

In this talk I will describe detector development work at Cornell, which has focused primarily on charge-integrating area detectors for both electron microscopy and x-ray science. I will discuss the development of a suite of charge-integrating hybrid pixel array detectors (PADs) that address issues of dynamic range, high-flux capability, time resolution down to the sub-microsecond regime, and that provide a platform for characterizing and exploring high-Z sensors, which are of particular interest for the detection of x-rays at energies above 20 keV.