AbstractID: 4158 Title: Active Matrix, Flat-Panel Imagers: From Rigid and Simple to Flexible and Smart

Almost two decades of intensive research and development have transformed the concept of capturing x-ray images with large area, solid-state devices based on active matrix addressing into a wide range of highly useful technologies. These digital technologies are based on the use of two-dimensional matrices of thin-film transistors utilizing amorphous silicon semiconductors, along with scintillator- or photoconductor-based x-ray converters. The numerous advantages of this general approach have led to the widespread introduction of active matrix, flat-panel imagers for projection and cone-beam tomographic applications in mammography, radiography, fluoroscopy, radiotherapy and other medical and industrial applications. However, it has become apparent that current devices suffer from a number of intrinsic limitations that affect their cost, performance, robustness, and form factor. Intriguingly, technologies emerging from on-going advances in displays offer the potential of enabling the creation of fundamentally different forms of active matrix x-ray imagers. These imagers would incorporate such innovations as flexible, plastic substrates or sophisticated in-pixel circuitry. In this presentation, an overview of possible directions for active matrix imager development will be presented, along with a description of the underlying advances in semiconductors and processing techniques that will drive these changes. In addition, the potential impact of such radically different forms of imagers upon performance, use and availability will be discussed.

Educational Objectives:

1. Review strengths and limitations of present-day active matrix x-ray imagers.
2. Describe semiconductor- and processing-based enhancements that could circumvent these limitations
3. Summarize likely effects of the application of such innovations to active matrix imager design