

A39

A 2D smart pixel detector for time resolved crystallography

Eric Beuville, C. Cork, T. Earnest, J. Millaud, D. Nygren, H. Padmore, B. Turko, and G. Zizka

Lawrence Berkeley National Laboratory, MS-29-100, 1 Cyclotron Rd, Berkeley, CA 94720

P. Datta and N. H. Xuong

University of California San Diego

A smart pixel detector is being developed for time-resolved crystallography for biological (protein crystallography) and materials science applications. Using the pixel detector presented here, the Laue method will enable one to study the time evolution of structural changes that occur with protein function.

The x-ray pixellated detector is bonded to the integrated circuit through a bump bonding process. The pixel size is $150 \times 150 \mu\text{m}$ in which a low noise preamplifier-shaper, a discriminator, and a 3 bit counter is integrated. The read out, based on the column architecture principle, will accept hit rates above $5 \times 10^8/\text{cm}^2/\text{s}$ with a maximum hit rate per pixel of 1 MHz. This detector will make possible time- resolved Laue crystallography in a frameless and dead-timeless operation mode.

Target specifications, architecture and preliminary results on a 8×8 prototype are presented.