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PImMS −An event-triggered time-stamping CMOS Image Sensor for Mass Spectrometry

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The PImMS Sensor is an event triggered time-stamp storing CMOS image sensor for Time Of Flight (TOF) Mass Spectrometry. The device features a 72 by 72 pixel array with better than 50 ns timing resolution and 4 registers per pixel for 12-bit time-stamp storage. The multiple registers and high temporal resolution allow the detection of all incident mass peaks within each measurement period without the need to gate or exclude certain masses, increasing throughput. By combining traditional TOF Mass Spectrometry techniques with a 2D pixelated detector it is possible to extract addition information about the spatial position or the velocity of the ions when generated.

The sensor has been designed and fabricated in the INMAPS 0.18 μm process which allows for the inclusion of complex full CMOS electronic circuits within the pixel without significantly affecting the detection efficiency of the monolithic sensor architecture. We will present an overview of the device design and features, measurements of device performance and results from the Mass Spectrometry application. Further applications for the sensor will also be described.

Primary author: Mr CLARK, Andy (STFC Rutherford Appleton Laboratory)

Co-authors: Dr NOMEROTSKKI, Andrei (University of Oxford); Dr VALLANCE, Claire (University of Oxford); Mr SLATER, Craig (University of Oxford); Mr WILMAN, Edward (University of Oxford); Mr CROOKS, Jamie (STFC Rutherford Appleton Laboratory); Mr JOHN, Jaya John (University of Oxford); Ms HILL, Laura (University of Oxford); Prof. BROUARD, Mark (University of Oxford); Dr TURCHETTA, Renato (STFC Rutherford Appleton Laboratory); Mr YUEN, Weihao (University of Oxford)

Presenter: Mr CLARK, Andy (STFC Rutherford Appleton Laboratory)

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