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**New modes of electron microscopy for materials science enabled by fast direct electron detectors**

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There is an ongoing revolution in the development of electron detector technology that has enabled modes of electron microscopy imaging that had only before been theorized. The age of electron microscopy as a tool for imaging is quickly giving way to a new frontier of multidimensional datasets to be mined. These improvements in electron detection have enabled cryo-electron microscopy to resolve the three-dimensional structures of non-crystalized proteins, revolutionizing structural biology. In the physical sciences direct electron detectors has enabled four-dimensional reciprocal space maps of materials at atomic resolution, providing all the structural information about nanoscale materials in one experiment. This talk will highlight the impact of direct electron detectors for materials science, including a new method of scanning nanobeam diffraction. With faster detectors we can take a series of 2D diffraction patterns at each position in a 2D STEM raster scan resulting in a four-dimensional data set. For thin film analysis, direct electron detectors hold the potential to enable strain, polarization, composition and electrical field mapping over relatively large fields of view, all from a single experiment.