Using far field high energy diffraction microscopy to characterize the state of polycrystalline material

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A suit of three dimensional x-ray microscopy tools such as far field high energy diffraction microscopy (HEDM) utilizing high energy synchrotron x-ray are becoming more widely available. These tools combined with various sample environments can be used to characterize the state of a polycrystalline material and its evolution at the micrometer length scale. The information obtained from these tools are unprecedented; when these tools are used appropriately, engineers and scientists can have access to the state of material inside the polycrystalline aggregate without destroying the aggregate and track the evolution with controlled stimuli. Here, we will review the far field HEDM technique with the 1-ID beam line at the Advanced Photon Source as a benchmark. We will provide a context of how this technique fits in with other high energy diffraction measurement techniques. We will discuss the technique’s capabilities and limitations.