

## AN ALTERNATIVE VOYAGE THROUGH RECIPROCAL SPACE

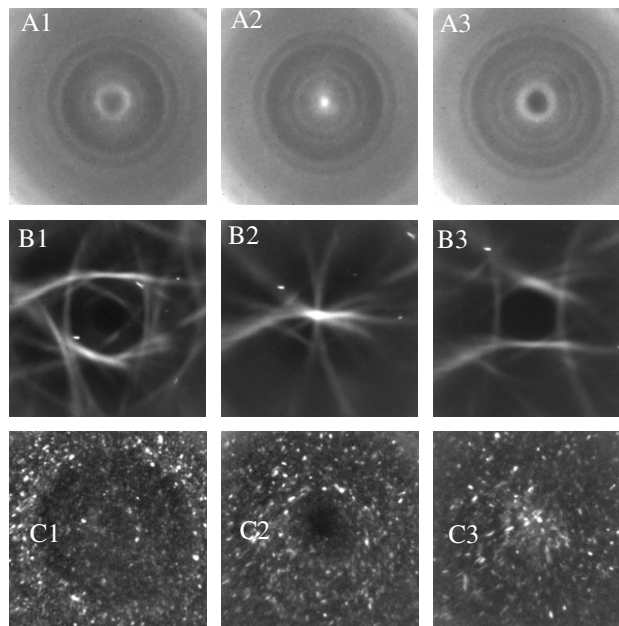
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We have presented elsewhere the basic principles of focal construct geometry that enables highly efficient harvesting of diffraction data from polycrystalline materials through novel, but simple, incident beam optics. The technique has the potential to increase the diffraction intensity collected at a point using a finite flux density available at the sample. The convergent nature of the geometry also has the potential for applications where limited size is critical e.g. for portable instrumentation.

Here, we present results that show, for the first time, how the diffraction patterns are formed when samples contain significant preferred orientation or relatively large grains. The results can be viewed in a striking movie format recorded as the sample to detector distance is increased (may be viewed at [http://www.youtube.com/watch?v=w\\_kzUQHnIhE](http://www.youtube.com/watch?v=w_kzUQHnIhE)). We show that for preferred orientation and large grain size, the technique performs well and retains its ability to produce diffractograms. Indeed, the approach has the additional benefit of significantly reducing effects of preferred orientation (such as wire textures) on the diffraction patterns without the need for any sample preparation.

Figures A1-A3 show the diffraction pattern features as the sample detector distance is increased through the 'focal' position for the 113 peak of  $\text{Al}_2\text{O}_3$ . Figures B1-B3 show a similar sequence for an Al foil possessing significant preferred orientation. Figures C1-C3 illustrate a large grain size sample ( $\text{NaClO}_3$ ) moving towards the region of a 'condensing' maxima.



Thus, this geometry acts to enhance the efficiency of harvesting coherent scatter and will complement other advances in source, moderator and sensor design. It will also act in a similar manner to enhance the speed and efficiency of energy dispersive diffraction systems.