# Electron Backscattering Diffraction

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### **EBSD** Definition

### **E**lectron **B**ackscattering **D**iffraction = EBSD



**Electron backscatter diffraction (EBSD)** is a <u>Scanning Electron Microscope</u> based microstructural-<u>crystallographic</u> characterization technique commonly used in the study of <u>crystalline</u> or <u>polycrystalline</u> materials.

The inelastically scattered electrons can subsequently be elastically scattered that is Bragg diffracted by lattice planes to produce a phenomenon known as Kikuchi lines

### Kossel cones:







Fig. 4.4. Formation of Kossel conics: (a) trat

## Formation of Kikuchi pattern in SEM



Tilting the specimen by angles of typically 60-70° allow more electrons to be diffracted and to escape towards the detector.

Kikuchi patterns can also be produced in the SEM by changing the direction of the incident beam.





FIGURE 19.1. An ideal DP containing both well-defined spots and clearly visible pairs of bright (excess) and dark (deficient) Kikuchi lines.



Fig. 9.5. Principle of (a) the stereographic projection and (b) the gnomonic projection methods of mapping a unit sphere onto a plane

The stereographic projection transforms great circles on the sphere into circles. Conversely, the gnomonic projection transforms all great circles into straight lines.

## How to draw Kikuchi lines for FCC lattice?



#### Step 2: construct [101] pattern



Knowing the [001] pattern we can construct the [101] pattern since a pair of lines is common to both

Real space



Reciprocal space

Real space

Pole figure





### Step 3: construct [111] and [011] pattern



Experimental Kikuchi map for fcc crystals and (B) indexed Kikuchi lines in the schematic map



Kikuchi map of croconic acid (orthorhombic)

#### Au(FCC) Kikuchi map



# Thanks for your attention!

References

David B. Williams, C. Barry Carter. Transmission Electron Microscopy A Textbook for Materials Science. Springer. 2009