

GADDS

TEXTURE ANALYSIS ON METALS USING THE HI-STAR TWO DIMENSIONAL, POSITION SENSITIVE DETECTOR

B. A. Squires

Area Detector - metals - texture analysis

Frequently the grains of polycrystalline metals align along a major crystallographic axis. This behavior is known as preferred orientation, and is also called texture. Materials that exhibit texture show an anisotropic behavior that can be related to various physical properties. To study this behavior, texture analysis uses either X-ray or neutron diffraction.

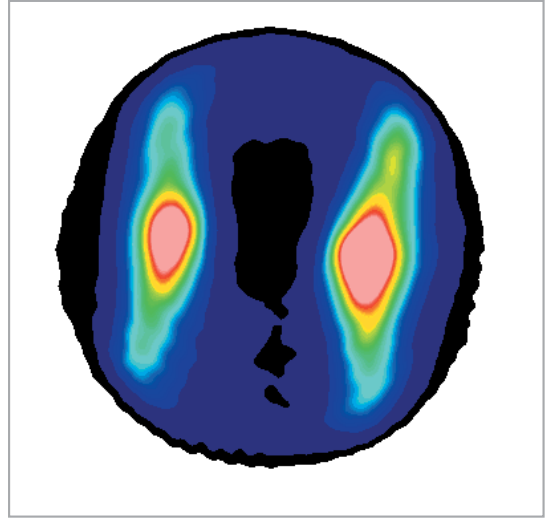
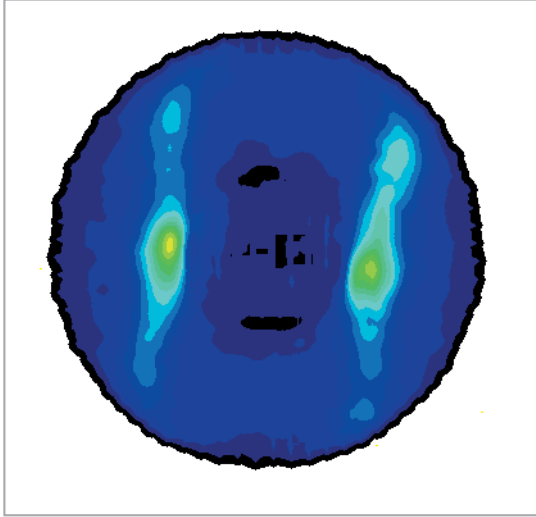
Preferred orientations are displayed in many forms, but most often as pole figures. These diagrams use intensity to demonstrate the density of a certain hkl pole with respect to the sample's coordinate system.

The conventional system for texture analysis is a four circle goniometer equipped with a scintillation counter

that measures only one point in space at a given time. Using the Bruker AXS HI-STAR two-dimensional detector offers two major advantages: several hkl's can be measured during a single experiment, and a wide range of chi is detected simultaneously. This significantly reduces the measuring time. For example, a conventional system usually takes from one to two hours to collect a single pole figure. In the same amount of time, a HI-STAR detector running General Area Detector Diffraction System (GADDS) software can collect data for three or more pole figures. This means that because more than a single pole figure is required to properly determine the orientation, GADDS can determine the orientation on most samples within two hours. GADDS also includes a script file interpreter, allowing the entire process of collecting data and producing pole figure plots to be automated. The following pole figures were determined from the same set of data.

Experimental Conditions

System:	Bruker's GADDS System with HI-STAR area detector
Source:	Cu anode, point focus, sealed tube
Monochromator:	flat graphite
Collimator:	500 μm pinhole
Goniometer:	PLATFORM 3-axis sample stage (chi fixed)
Count time:	60 seconds/frame
Sample-detector distance:	60 cm
Measurement:	72 frames collected at phi interval of 5° No background correction was necessary



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