System and Method for Determining 3-Dimensional Location of Defects in a Uniaxial Crystal

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Technology description

Invention

An optical inspection system that utilizes polarimetry, pecialized illumination and imaging techniques to avoid the inaccuracies caused by image doubling, ray splitting, and defects shadowing each other. This novel inspection system greatly improves the accuracy in identifying the location of defects within boules of birefringent material. Polarization control provides even greater sensitivity. The system is capable of full 3D representations of the bulk material, which can be acquired in a single scan to allow easy visualization of defect positions.

Background

The inspection of bulk birefringent materials is in increasing demand as advanced technology markets such as the solar power industry expand. As competitors push to maximize returns from the materials they generate, inspection methods that precisely identify the locations of defects in birefringent materials have become critical to obtaining the largest amount of usable product per batch. Optical methods of inspection are popular for their consistency and speed of inspection, but the optical nature of birefringence complicates inspection by introducing unwanted effects such as ray splitting, image doubling, and shadowing. Although some inspection methods are aided by the use of polarimetry, this can further complicate the optical approach if not employed with great care.

Application area

Birefringent materials inspection.

Other polarization materials inspection.

Advantages

Avoids problems of ray splitting and image doubling.

Novel illumination prevents defects from shadowing each other.

Acquires full 3D pictures of the sample along with its defects.

Institution

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