多晶矽太陽能晶片之微隱裂檢測

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摘要

To discover invisible micro cracks from a multi-crystalline silicon solar wafer image is not an easy task because of its heterogeneously textured background. The difficulty is twofold. First, invisible micro cracks must be visualized to imaging devices. Second, an image processing sequences capable of extracting micro cracks from cracked images must be developed. To solve the problems, a near infrared imaging system was first set up to capture images of invisible micro cracks. After being able to see invisible micro cracks, a region-growing-based flaw detection algorithm was developed to extract micro cracks from the captured images. The experimental results showed that the proposed micro cracks inspection system is effective in detecting micro cracks. Besides, it is also applicable to inspect silicon solar wafers for stain, pinhole, inclusion, and macro crack. The overall accuracy of the defect detection system is 99.85%. The advantages afforded by the system including excellent crack detection sensitivity, ability to detect hidden subsurface micro cracks, and low cost.

關鍵字：Keywords: Micro Crack, Flaw Detection, Region Growing, Solar Wafer, NIR Imaging.