Dino-Lite Polarizing Digital Microscopes



Introduction

Microscopes with polarizers are a crucial tool to modulate light and use it to study materials in many different ways. Dino-Lite polarizing digital microscopes have been designed to reduce glare, view subsurface layers, and improve image contrast. When used with a backlight polarizer, users are also able to detect mechanical stress, as well as identify optically anisotropic materials. Dino-Lite polarizing microscopes are used in a wide range of fields, including forensics, manufacturing, health, mineralogy, research, and biology.

Polarized Light Microscopes

Most polarized light microscopes are equipped with two polarizers to produce the linearly polarized light and create different light polarization configurations. One polarizer is placed in front of the light source to polarize the light. The other polarizer is placed between the target and camera sensor or observation tube that will block or pass the light reflected or transmitted by the target. Polarized light microscopes can create different polarization configurations that depend on the relative orientation between polarizers: parallel polarization is for polarizers that are oriented parallel to each other, and cross polarization is the configuration for polarizers that are oriented perpendicular to each other. Depending on the polarization configuration of incident light with the target, light will be transmitted or blocked.



Design of Dino-Lite Polarizing Digital Microscopes

Dino-Lite polarizing digital microscopes are equipped with an adjustable and a fixed polarizer, as shown in the picture below. The adjustable polarizer, positioned in front of the Dino-Lite's LEDs, polarizes the microscope light source. The fixed polarizer, placed behind the lens of the Dino-Lite, polarizes the light between the target and the camera sensor. The degree of orientation between polarizers can be controlled by rotating the wheel of the



adjustable polarizer. The rotating wheel has an arrow that points at the current degree of orientation between polarizers with "0" being parallel polarization and "90" being cross polarization.



Cross Polarization

Dino-Lite polarizing digital microscope in its parallel and cross polarized configurations.



Applications of Dino-Lite Polarizing Digital Microscopes

Reducing glare

Glare is a mirror-like reflection that hinders inspections in a broad range of applications. Dino-Lite polarizing digital microscopes can reduce the glare for clearer images. Any user inspecting materials with flat surfaces or surfaces covered with grease, oil, or liquids will benefit from using Dino-Lite polarizing digital microscopes.



Circuit board under parallel (left) and cross polarization (right) clearly shows a reduction of glare when cross-polarized.

Identifying and characterizing optically anisotropic materials

When using a BL-ZW1 backlight polarizer and a Dino-Lite polarizing digital microscope, observers can identify and characterize optically anisotropic materials. Dino-Lite polarizing microscopes for studying optically anisotropic materials are commonly used in many applications in medicine, geology, forensic science, manufacturing, and material science. Crystals, many plastics, and biological tissues are some examples of optically anisotropic materials that can be studied with Dino-lite polarizing digital microscopes.





Inspection of nylon fibers under parallel (left) and cross polarization (right) with BL-ZW1 backlight polarizer and Dino-Lite polarizing microscope.



Inspection of a thin section of Gedrite under parallel (left) and cross polarization (right) with BL-ZW1 backlight polarizer and Dino-Lite polarizing microscope



Viewing upper and lower layers of the skin

Dino-Lite polarizing microscopes are widely used for examining the upper and lower layers of the skin. This is possible since the upper layer of the skin reflects light preserving its polarization while lower layers scatter and randomize the polarization. As a result, parallel polarization emphasizes the upper layers of the skin, and cross polarization emphasizes the subsurface skin layers.



Parallel polarization image (left) emphasizes the upper layer of the skin while the cross polarization image (right) emphasizes the lower layers.



Parallel polarization image (left) emphasizes the upper layers of the scalp while the cross polarization image (right) emphasizes the lower layers.



Other applications

Dino-Lite polarizing digital microscopes can be used in many more applications for viewing surface and internal layers of a variety of materials. For surface inspections, the Dino-Lite can assist in viewing coated, glass, or film-covered surfaces, as well as revealing impurities on metal surfaces. And for internal inspections, the Dino-Lite allows for the detection of internal stresses in glass and other transparent materials, as well as to view defects within glasses, gems, and liquid crystals.



Improved image contrast of gold contact pads and bonding wires under parallel (left) and cross polarization (right).



Inspecting mechanical stress of plastic under parallel (left) and cross polarization (right).

This document served to introduce the Dino-Lite polarizing microscopes design and some of its applications. However, there are many more uses and industries that go beyond the scope of this article. To inquire if a Dino-Lite polarizing microscope is suitable for your applications, please contact us at support@dinolite.us.

