

Confocal laser imaging of calcareous nannofossils

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Calcareous nannofossils are typically studied using various transmitted light microscope techniques, including cross-polarized light and phase contrast, as well as scanning electron microscopy (SEM). Light microscopy takes advantage of the anisotropy of calcite, which allows coccoliths to produce birefringence under cross-polarized light. Sample preparation for the light microscope is simple and quick. Scanning electron microscopes provide much higher resolution, allowing imaging of the detailed structure of calcareous nannofossils, but this method requires coating the sample with an ultrathin layer of a non-reactive metal (such as gold or gold-palladium) prior to analysis. Additionally, SEM analysis is done under vacuum, which requires extra time during analysis. Here, we show results from a new imaging technique, confocal laser scanning, using a Keyence VK-X3000 digital microscope. Sample preparation for this method is similar to that for the light microscope, with the exception that no coverslip is placed over the sample, allowing the laser direct access to the material. The microscope is equipped with a 100× objective to allow high-resolution imaging of specimens. The digital microscope software allows users to take multiple images through a specimen to create a 3D image, which can then be analyzed using a variety of measurements. The laser scanning technique creates high-resolution images that show detailed coccolith structure, analogous to SEM images. We compare images taken with the confocal laser scanning technique with those using standard light microscopy and SEM. We conclude that the confocal laser scanning technique is a fast and easy-to-use microscopy technique for examining coccolith structure.