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Cosmetic Assessment of the Human Hair by Confocal Microscopy

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ABSTRACT

The optical sectioning property of the confocal microscope offers a breakthrough from the classic observation of the hair in a scanning electron microscope (SEM).

Confocal microscopy requires minimal sampling preparation, and the hair can be observed in its natural environment with less damage than by other microscopic methods such as SEM.

While used in the reflection mode, the true morphology of the cuticle and the various exogenous deposits at the surface can be identified and quantified.

This relatively noninvasive, nondestructive technique is routinely used by us to monitor the efficiency of cleansing shampoos, to assess the homogeneity of layering polymers, and to evaluate the changes they induce in the optical properties of the hair surface in terms of opacity, transparency, and brilliancy.

A second important field of investigation uses the fluorescence channel which reveals the internal structure of the hair.

Fluorescent probes (rhodamine and its derivatives) demonstrate the routes of penetration and outline the geometry of cortical cells and of the medulla according to their lipophilic or hydrophilic properties.

A volume rendering of a hair cylinder provides a better understanding of the interrelationships between cuticle cells, cortical cells, and the medullar channel. This recent technology is becoming an invaluable tool for the cosmetic assessment of the hair.