



Scanning Electron Microscopy

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Tradename: AC Split End Complex MSX

Code: 20375MSX

CAS #: 562075-01-5 & 68553-81-1

Test Request Form #: 7641

Lot #: 7809500

Test Performed:

Scanning Electron Microscopy (SEM)

Sponsor: Active Concepts, LLC; 107 Technology Drive Lincolnton, NC 28092

Study Director: Maureen Danaher

Principle Investigator: Kara Rivera

Background

This study was conducted to determine if **AC Split End Complex MSX** is capable of protecting the hair when thermal styling stress is applied.

Methods & Materials

This study was conducted by salon professionals using Royal Impression's 100% Unprocessed Brazilian Virgin Human Hair. Test swatches were treated and submitted for testing. One swatch was left untreated by spritzing with water, blown dry for two minutes, and flat ironed at 232°C (450°F) for 25 passes. The other test swatch was treated, spritzed with a 2.0% **AC Split End Complex MSX** solution and water, blown dry for two minutes, and flat ironed at 232°C (450°F) for 25 passes. A second set of test swatches were bleached (40V) then treated with either water or 2.0% **AC Split End Complex MSX** water solution, followed by a two-minute blow dry and 5 passes through a flat iron at 232°C (450 °F). The swatch treatment was designed to mimic long-term effects of styling the hair. It is important to note no additives or fixatives were used in the test solution. This was done intentionally in order to see clear results.

Gaston College Textile Technology Center located in Belmont, North Carolina was asked to perform Scanning Electron Microscopy Imaging (SEM) on the swatches provided by Active Concepts, LLC. Gaston College used a Zeiss DSM 962 to perform the test at 20.0kV using a magnification range from 200x-800x. This method utilizes an electron microscope that produces images of chemically treated hair by scanning the hair with a focused beam of electrons. These electrons interact with the atoms of the hair sample to provide longitudinal and cross-section images of the hairs surface topography and surface composition.

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The sample identifications are listed below:

Parameter	Test Sample ID
Straightened Virgin Hair, Untreated	Sample A
Straightened Virgin Hair + 2.0% AC Split End Complex MSX Treated	Sample B
Bleached (40V) Hair, Untreated	Sample C
Bleached (40V) Hair + 2.0% AC Split End Complex MSX Treated	Sample D

Results

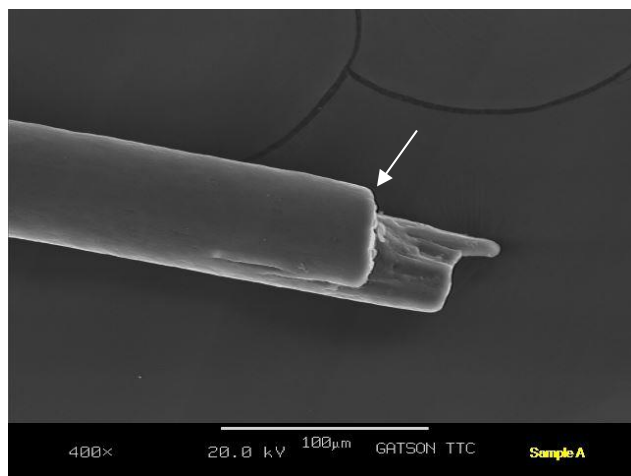


Figure 1. Longitudinal image of Straightened Hair, Untreated. The hair strand is split, showing a damaged cuticle.

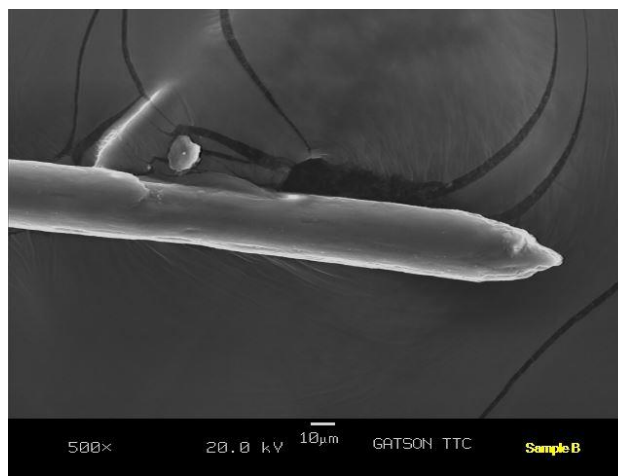


Figure 2. Longitudinal image of Straightened Hair Treated with 2.0% **AC Split End Complex MSX**. The hair is intact and protected.

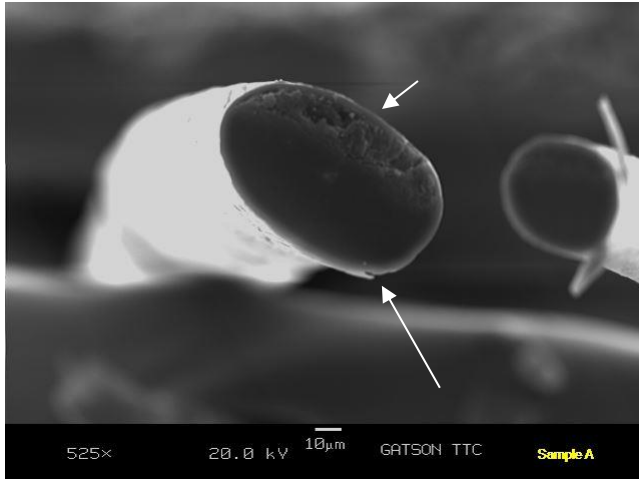


Figure 3. Cross-sectional image of Straightened Hair, Untreated. The hair is showing signs of damage at the edges and cuticle flaring.

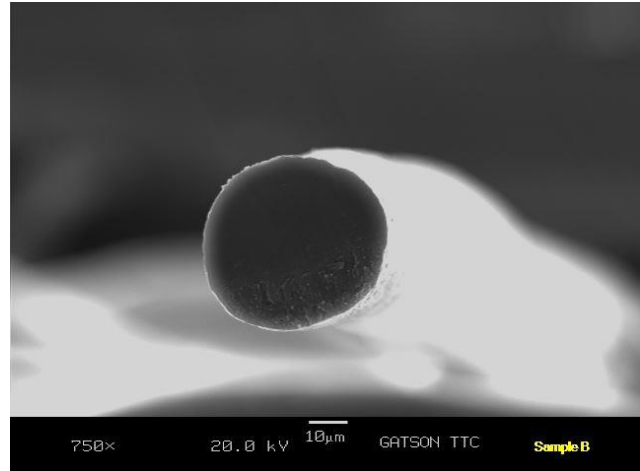


Figure 4. Cross-sectional image of Straightened Hair Treated with 2.0% **AC Split End Complex MSX**. The cuticle layer is smooth with no flaring.

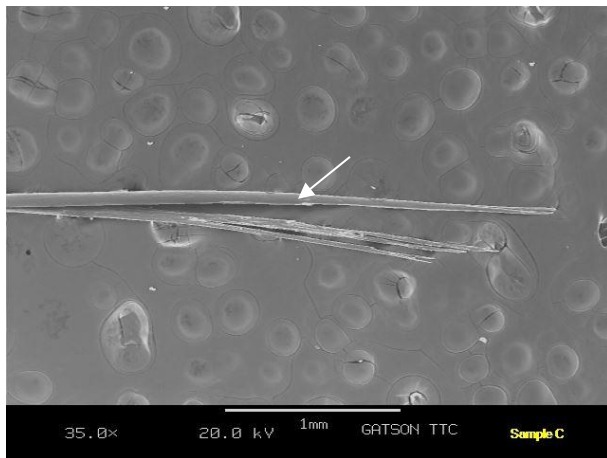


Figure 3. Longitudinal image of Bleached Hair (40V), Untreated. The hair strand is split in half and shows extensive damage to the cuticle.

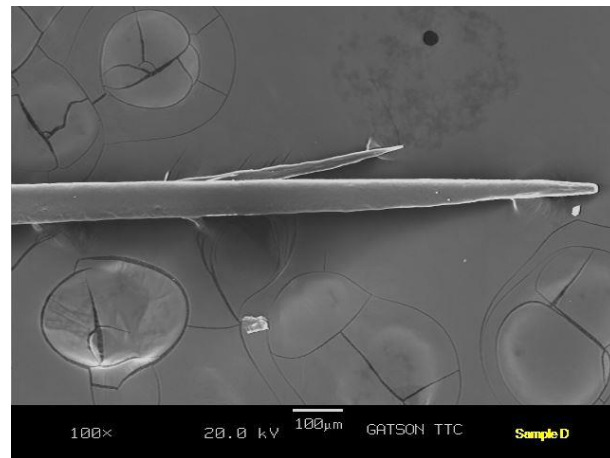


Figure 4. Longitudinal image of Bleached Hair (40V), Treated with 2.0% **AC Split End Complex MSX**. The hair is intact and protected.

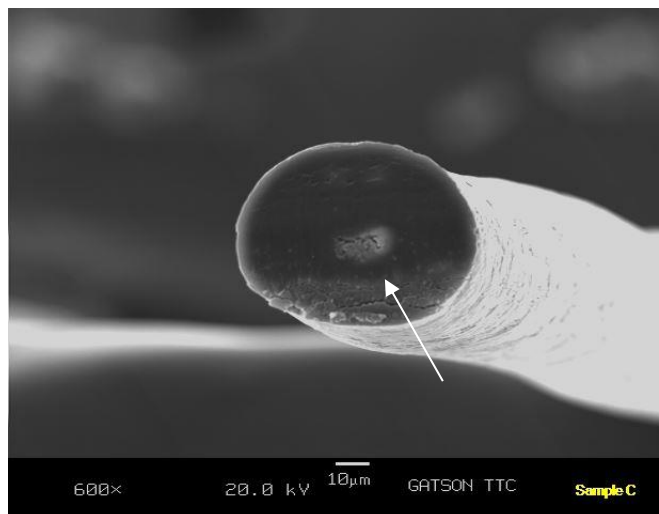


Figure 3. Cross-sectional image of Bleached Hair (40V), Untreated. The hair shows crumbling at the edges of the cuticle. Note that the cortex is cracked in the center.

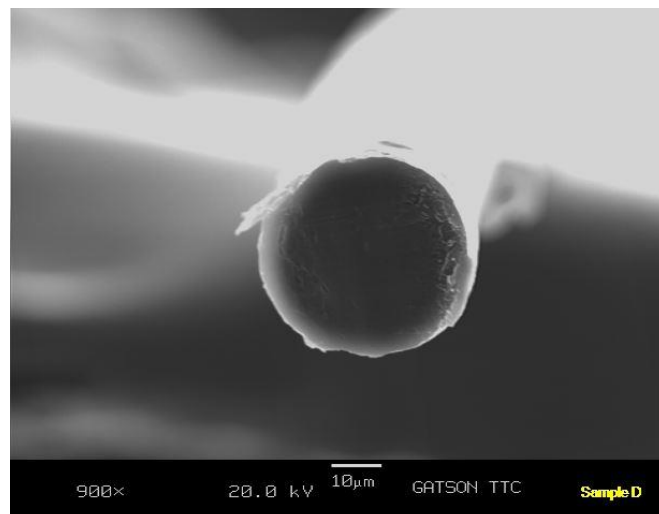


Figure 4. Cross-sectional image of Bleached Hair (40V), Treated with 2.0% **AC Split End Complex MSX**. No cracking within the cortex of the hair strand.

Discussion

The SEM images depict how the outermost layer of the hair, the cuticle, is effected by stressors, in this case thermal styling stressors and chemical bleach treatments. The SEM imagery results of the Straightened Untreated Hair samples depict an extensively damaged, split cuticle. The cuticle acts as a protective layer to the fiber. This type of damage leads to irregular growth, breakages, and overall unhealthy, dead appearance. The SEM imagery results of the Straightened + Bleached Untreated Hair samples show cracks within the cortex surrounded by crumbling cuticle layers. This type of damage contributes to inevitable loss of moisture and leaves hair strands more prone to breaking and splitting.

When the untreated images are compared to the **AC Split End Complex MSX** treated swatches, a significant decrease in damage of the both the cuticle and cortex is exhibited. Better yet, the **AC Split End Complex MSX** treated SEM images prevented cortex cracking in both Straightened and Straightened + Bleached samples. Overall **AC Split End Complex MSX** is an ideal addition to everyday treatment to repair and protect against thermal styling stressors and chemical treatments.