



# Scanning Electron Microscopy

info@activeconceptsllc.com • Phone: +1-704-276-7100 • Fax: +1-704-276-7101

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**Tradename:** ProCutiGen® Thermal Shield

**Code:** 20828

**CAS #:** 69430-36-0

**Test Request Form #:** 3299

**Lot #:** NC170406-F

**Test Performed:**

Scanning Electron Microscopy (SEM)

## Background

Everyday stressors come in all forms whether environmental, chemical, or thermal. Rather than focusing on repairing broken bonds that occur during physical and thermal stress, **ProCutiGen® Thermal Shield** consists of bivalent cationic peptides that create a *de novo* cuticle on the hair to prevent damage from happening in the first place.

This study was conducted to determine if **ProCutiGen® Thermal Shield** is capable of protecting the hair when thermal styling stress is applied.

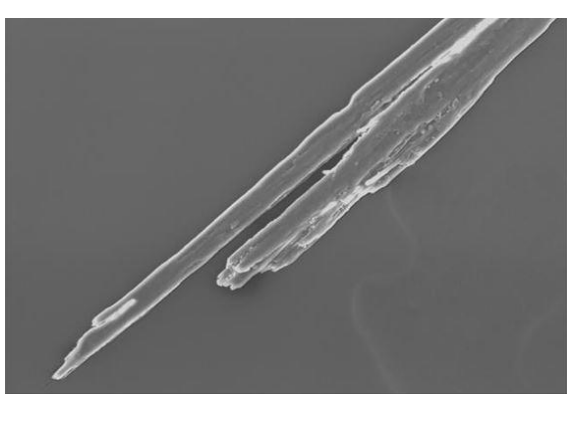
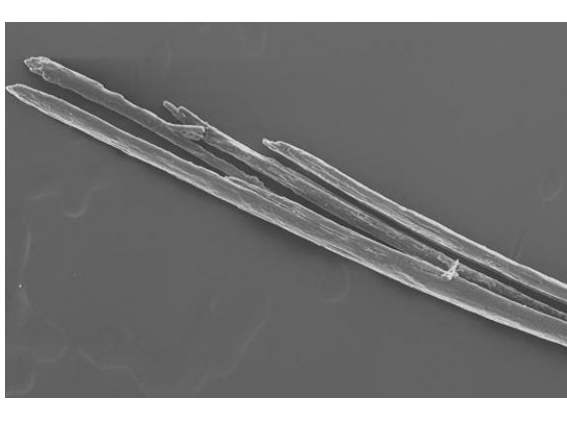
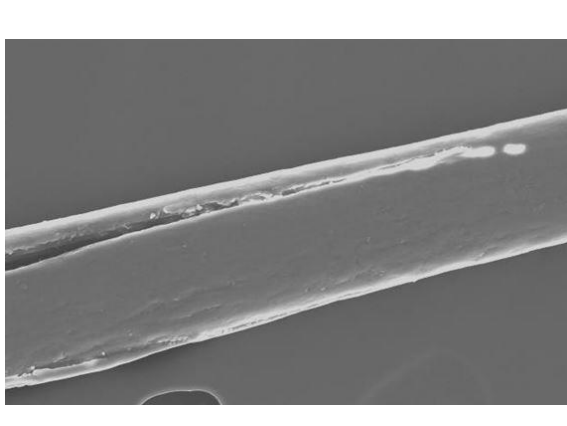
## Methods & Materials

This study was conducted by salon professionals using Sensationnel Bare & Natural Brazilian 100% Virgin Remi Unprocessed Human Hair (Hair Zone Moonachie, NJ). One swatch, left unaltered, was analyzed as the control. Two test swatches were treated and submitted for testing. One swatch was treated by spritzing with water, blown dry for two minutes, and flat ironed at 450°F, 5 run throughs. The other test swatch was treated, spritzed with a 2.0% **ProCutiGen® Thermal Shield** solution and water, blown dry for two minutes, and flat ironed at 450°F, 5 run throughs. The swatch treatment was designed to mimic everyday 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 visually 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 50x-300x. This method utilizes an electron microscope that produces images a 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 images of the hairs surface topography and surface composition.

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## Results

Swatch Description	SEM Image
Untreated Virgin Hair	
Water + Blown Dry & Flat Ironed	
Water + <b>20828 ProCutiGen® Thermal Shield</b> + Blown Dry & Flat Ironed	



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## Discussion

Standard Electron Microscopy (SEM) imaging shows high resolution images of the hair cuticles of each hair swatch. The SEM images depict how the outermost layer of the hair, the cuticle, is effected by stressors, in this case thermal styling stressors. The SEM imaging demonstrates that, Untreated Virgin hair is clearly already prone to damage from everyday aggressors, showing characteristic signs of breakdown. The imagery results of the water treated, curled sample depict an extensively damaged, split cuticle. This type of damage leads to irregular growth, breakages, and overall unhealthy, dead appearance. At a singular level, one cuticle may not seem important, but these strand to strand imperfections contribute to a much bigger picture of unhealthy and unprotected hair. When the untreated images are compared to the **ProCutiGen® Thermal Shield** treated swatches, a significant decrease in damage of the cuticle is exhibited. Better yet, the **ProCutiGen® Thermal Shield** treated SEM images depict the creation of a *de-novo* cuticle on the damaged cuticle. The cuticle corrects and acts as a protective layer to the fiber. The cuticle formation **ProCutiGen® Thermal Shield** employs also exhibits properties such as moisturization, pH balance, barrier protection, and additionally, protection from hair weakening after exposure to heat rendering **ProCutiGen® Thermal Shield** the ideal addition to everyday treatment to repair and protect against everyday stressors as well as heat styling stressors.

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