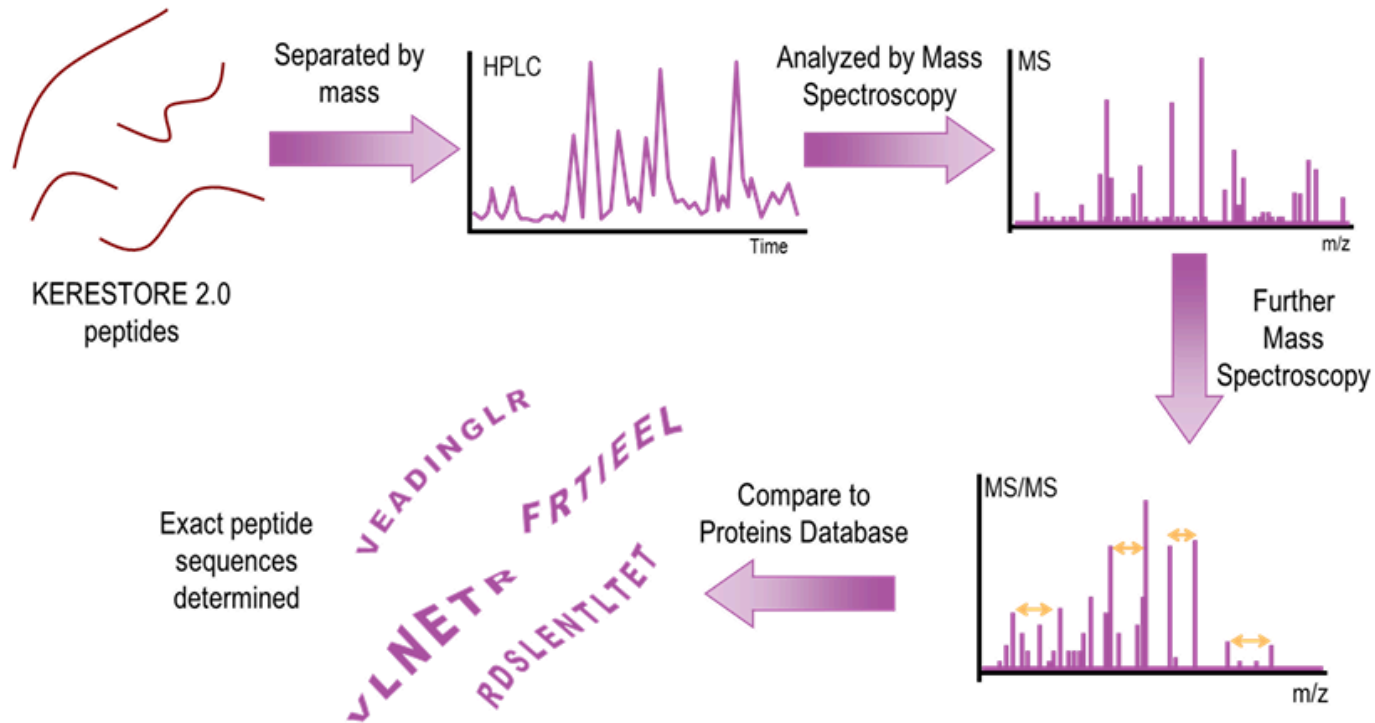


Proteomics utilizes High Performance Liquid Chromatography (HPLC) and Mass Spectrometry (MS) to separate complex mixtures of peptides by mass. Each peptide is then isolated in the mass spectrometer and bombarded with molecules of an inert gas in order to break it into smaller pieces. These fragments are then examined by a second MS experiment which provides a 'fingerprint' spectrum; comparison of this unique spectrum to a protein database allows the amino acid sequence of each peptide to be determined.



**Figure 1: An overview of the Proteomics method of analyzing peptide sequences**

Our proprietary manufacturing method using gentle enzyme hydrolysis ensures that KERESTORE 2.0 replicates amino acid sequences naturally found in hair keratin proteins, allowing KERESTORE 2.0 to repair and condition the most damaged areas of the hair cuticle.

## **Targeted Care for Damaged Hair**

The cuticle has a major impact on the appearance and manageability of the hair; constantly under attack from everyday styling, chemical processing and UV exposure, damage to the cuticle directly affects the look, feel and condition of the hair.

If a hair fiber is analyzed from root to tip, it is found that the degree of damage to the cuticle increases as exposure to chemical treatments and mechanical manipulation takes its toll. The closest resemblance to virgin hair, the root has the least amount of damage of any section of the hair, while repetitive combing, drying, straightening and curling all start to impact upon the health of the mid-section of the hair. After months of exposure to colorants, chemical treatments and various other styling treatments, the hair tip has the most cuticular damage.

## **Time of Flight Mass Spectroscopy**

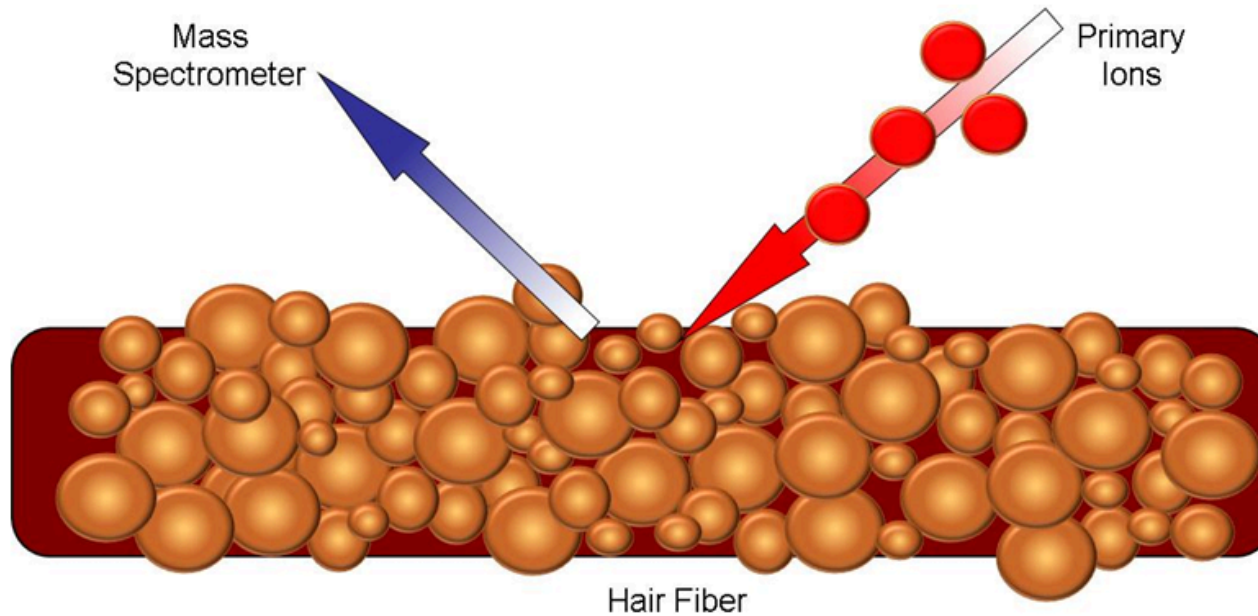
A novel method of acquiring detailed information about the surface chemistry of hair, Time of Flight Mass Spectroscopy (ToF-SIMS) is a technique which can provide detailed information about the surface chemistry of human hair by allowing the deposition of actives on the hair fiber to be visualized. This high resolution mass spectroscopy method has been used to identify and map the deposition of KERESTORE 2.0 along the hair fiber, demonstrating that KERESTORE 2.0 deposits on the most damaged areas of the hair cuticle, intelligently restoring the most damaged areas of the hair's surface.

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**CRODA**



**Figure 2: ToF-SIMS uses primary ions to create an image of the hair's surface**

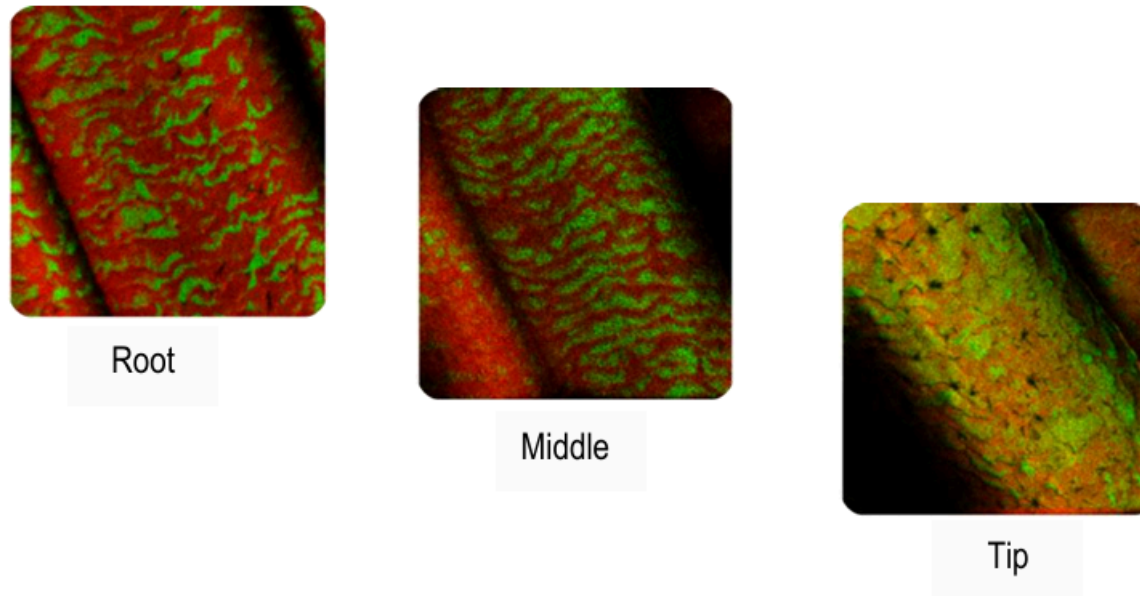
Primary ions directed to the surface of a hair fiber dislodge species from the cuticle. Although most of the dislodged species are neutral, between 1 and 10% are charged; these are known as secondary ions. These secondary ions are focused by charged detector plates and analyzed by a mass spectrometer, allowing an image to be created, with each pixel representing a peak in the mass spectrum.

The hair becomes progressively more anionic from root to tip as the degree of damage increases. The use of imaging ToF-SIMS has shown that KERESTORE 2.0 deposits preferentially at the most damaged areas of the hair's surface; intelligently restoring the hair cuticle. European hair tresses were bleached and then either left untreated or treated with an aqueous solution of KERESTORE 2.0. The image map produced for the tresses treated with KERESTORE 2.0, Figure 3, shows the deposition of the active at the most damaged areas of the hair's surface, proving that KERESTORE 2.0 goes directly to where it is needed most.

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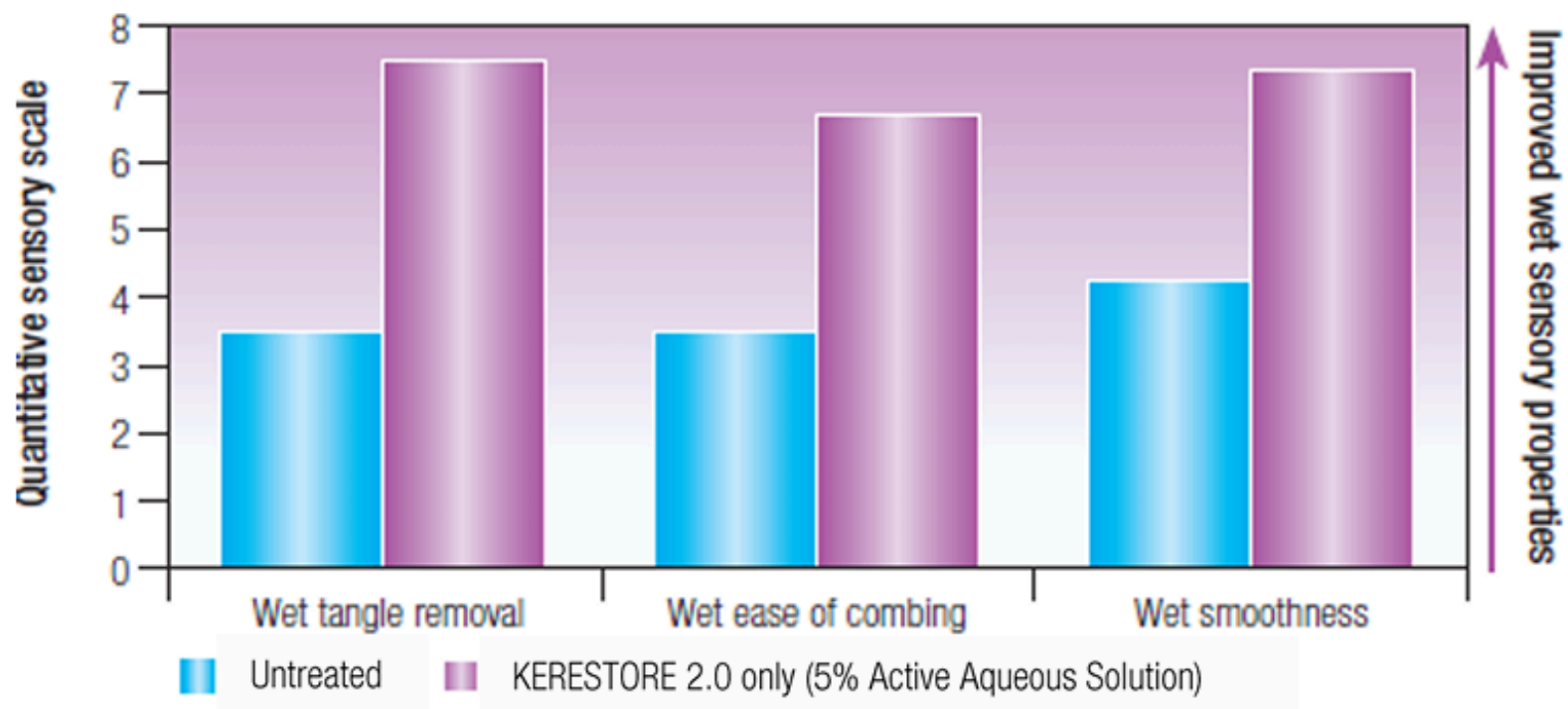
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**Figure 3: ToF-SIMS images show how KERESTORE 2.0 intelligently restores damaged hair**

The images show that there is less deposition of KERESTORE 2.0 at the root of the hair fiber, where there is less damage, with extensive coverage at the severely damaged tip.



*\*Note: on the sensory scale used for profiling, notes from 1 to 3 are poor, from 4 to 6 are average, and from 7 to 9 are good.*