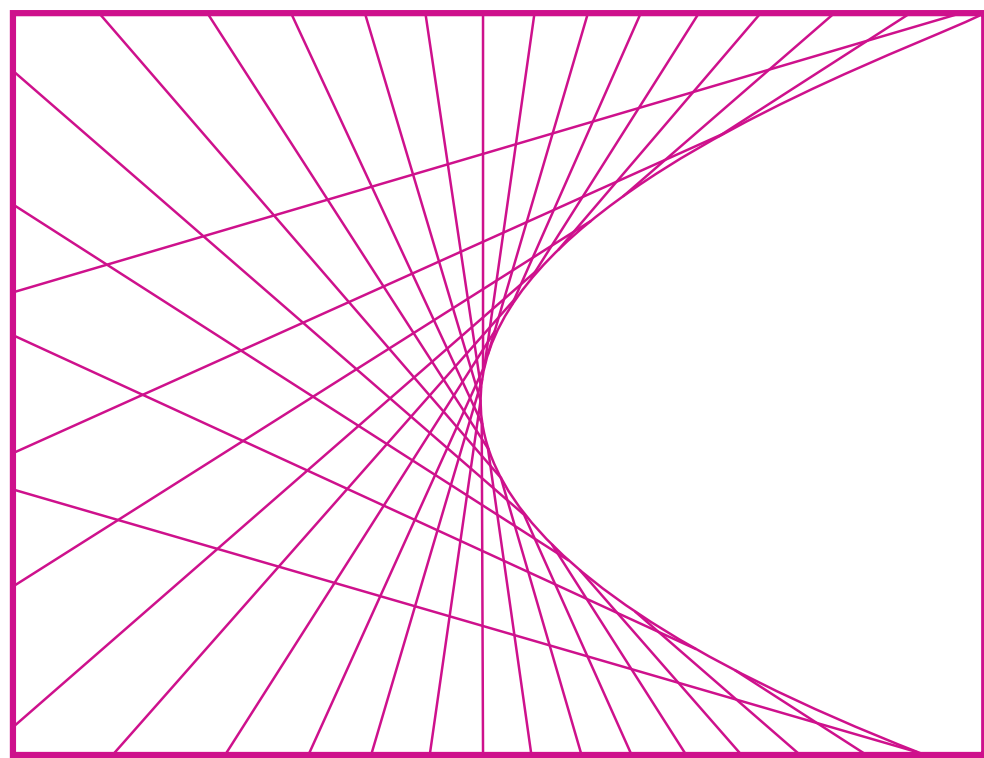




SP Equation

3D VOLUME MEASUREMENT SYSTEM ASSESSMENT OF HAIR TREATMENT IMPACT ON VOLUME AND FLY AWAY FRIZZ

Kiran NOWBUTH and Pascal STERLE – SP EQUATION
150 av Celestin Coq, 13790 Rousset FRANCE

Robert GEORGE and Sébastien BREUGNOT - BOSSA NOVA TECHNOLOGIES
1922 Jefferson Blvd, Culver City, CA 90230, USA



Principle

The device acquires 36 on-the-fly pictures of the swatch, every 10° step. The motorized stage moves slowly over a 360° range which enables the hair swatch to not have any deformation (no twist, wind, or dynamic movement) when the picture is snapped.

On each of the 36 raw images, an algorithm separates the bulk area from the frizzy parts, (fly away fibers). The 3D volume of the hair bulk is reconstructed from the 36 bulk images, and the average frizz is estimated. The 3 calculated parameters are :

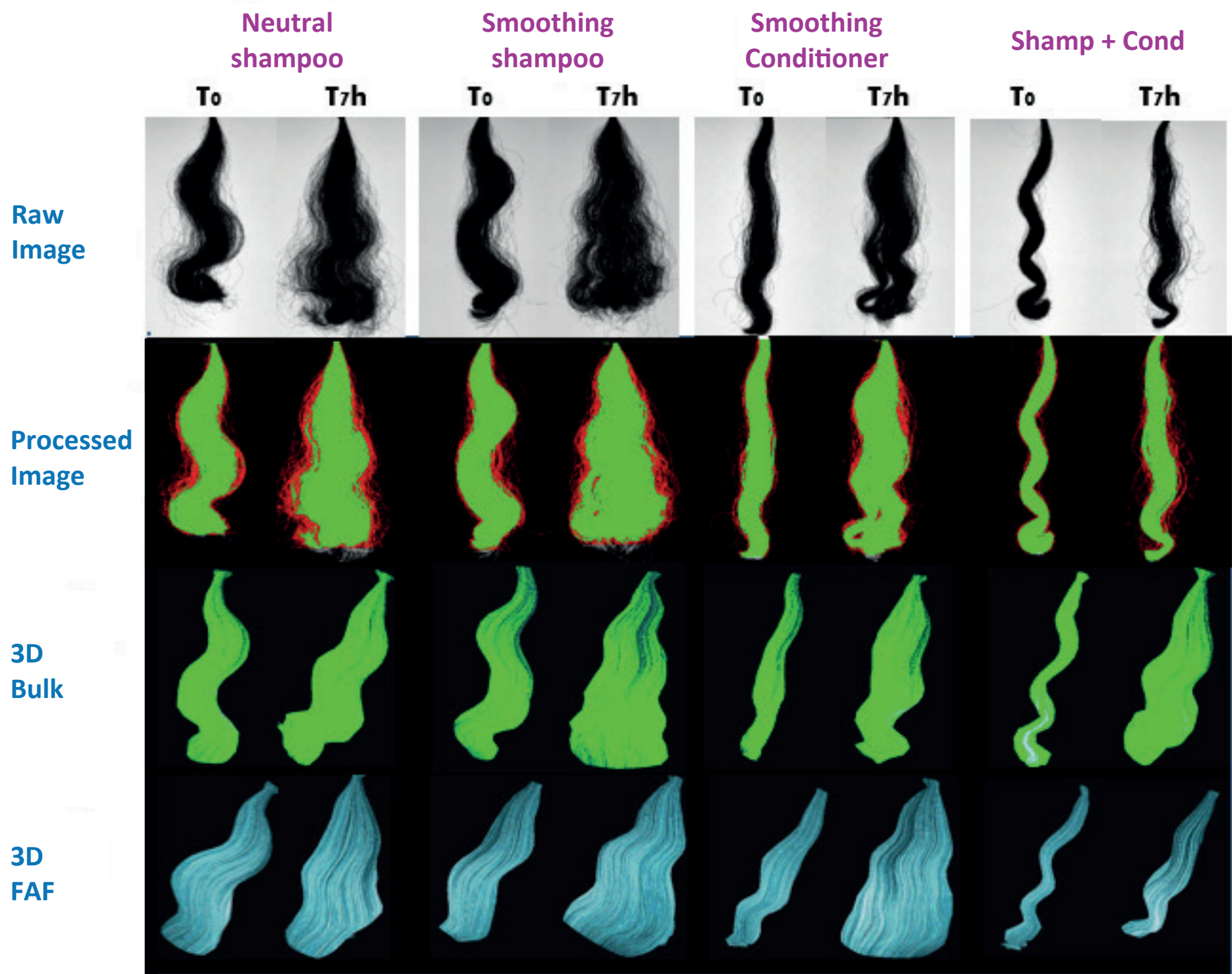
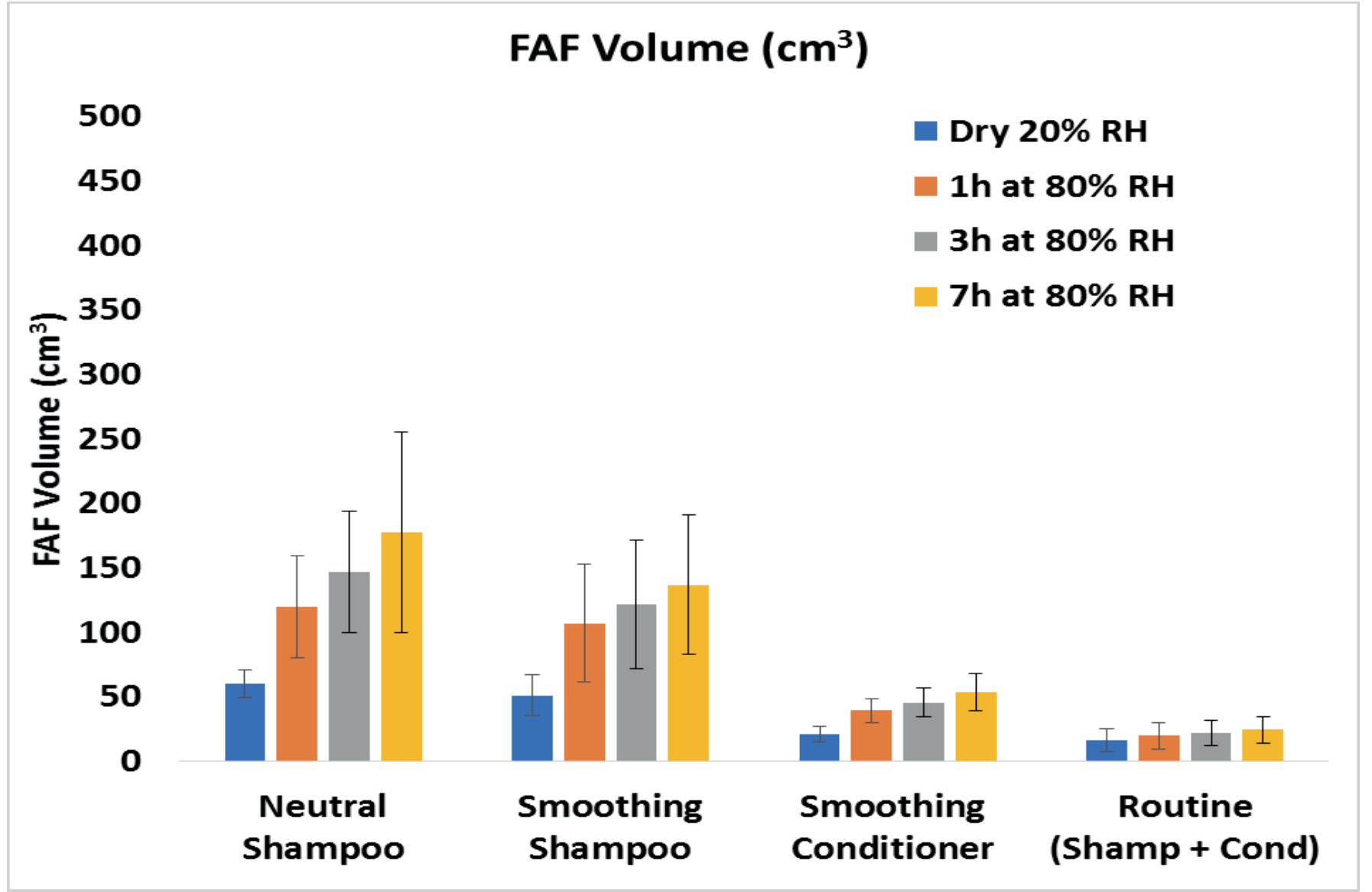
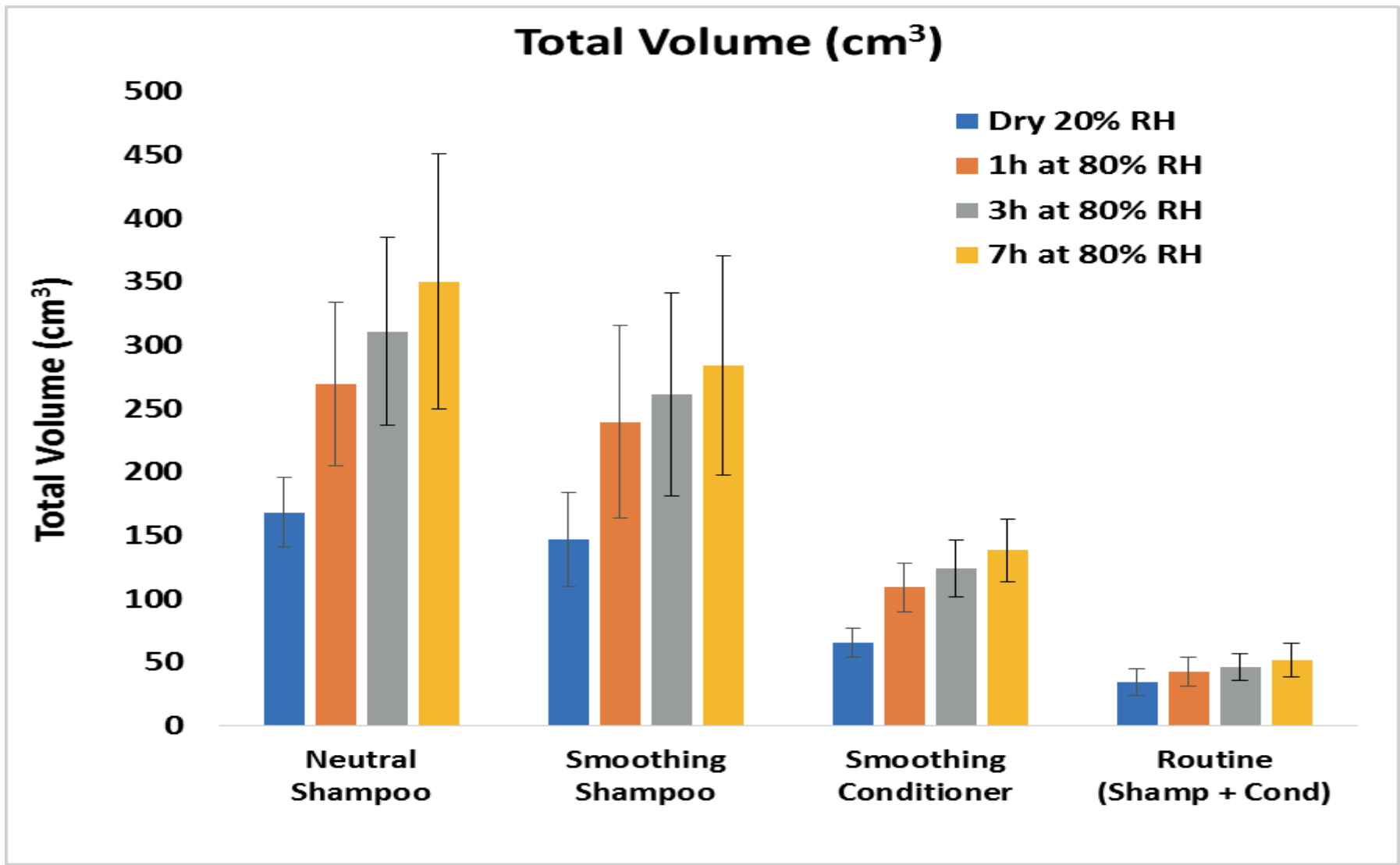
- the Bulk (in cm³),
- the Fly Away Frizz / FAF (in cm³),
- the Total Volume (in cm³)



Claims Substantiations

Impact of Shampoo Conditioner And Routine on Hair Volume/FAF

- Hair: wavy Caucasian Type III
- Measurement after drying and after 1h, 3h, 7h, at 80% humidity.

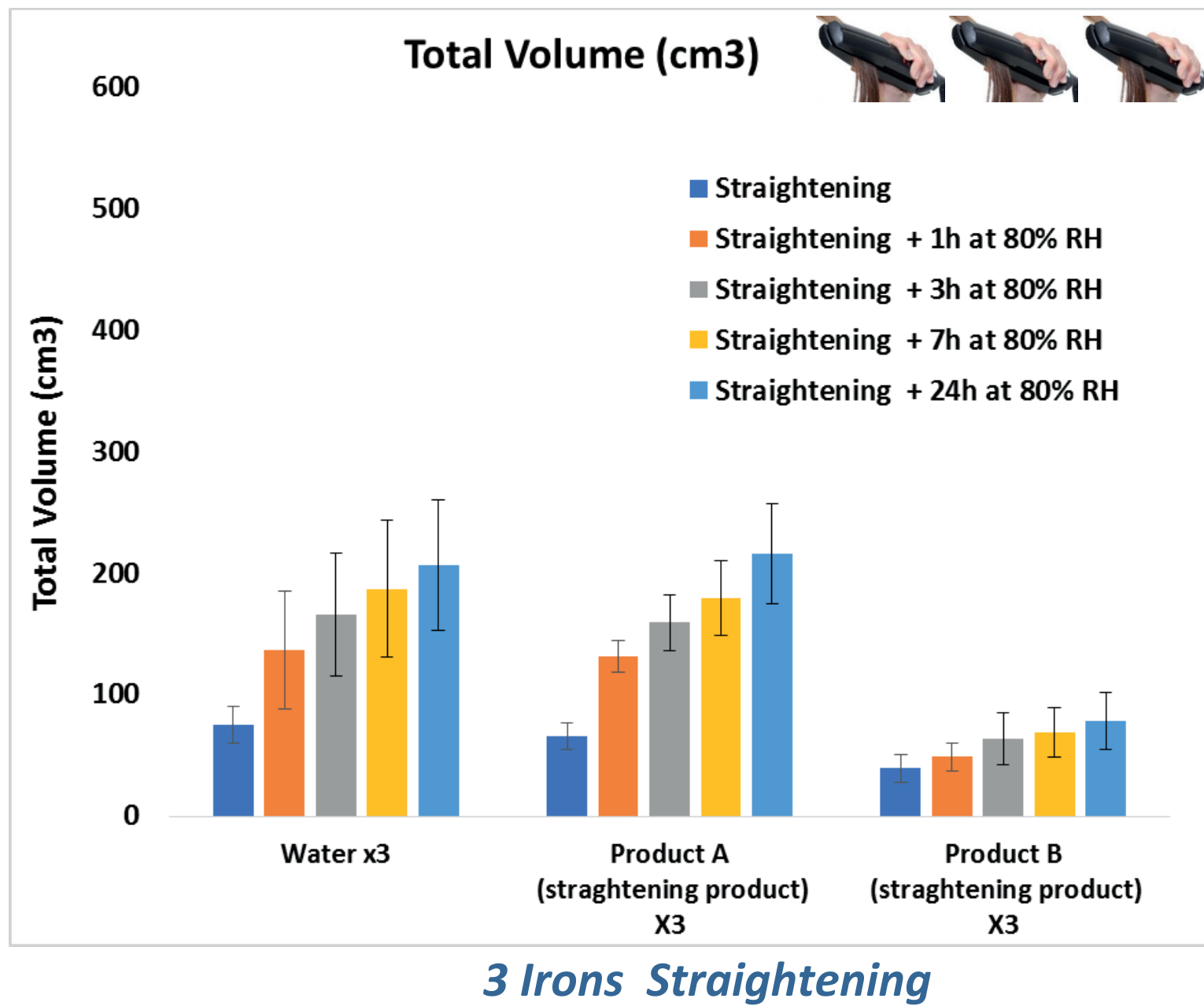
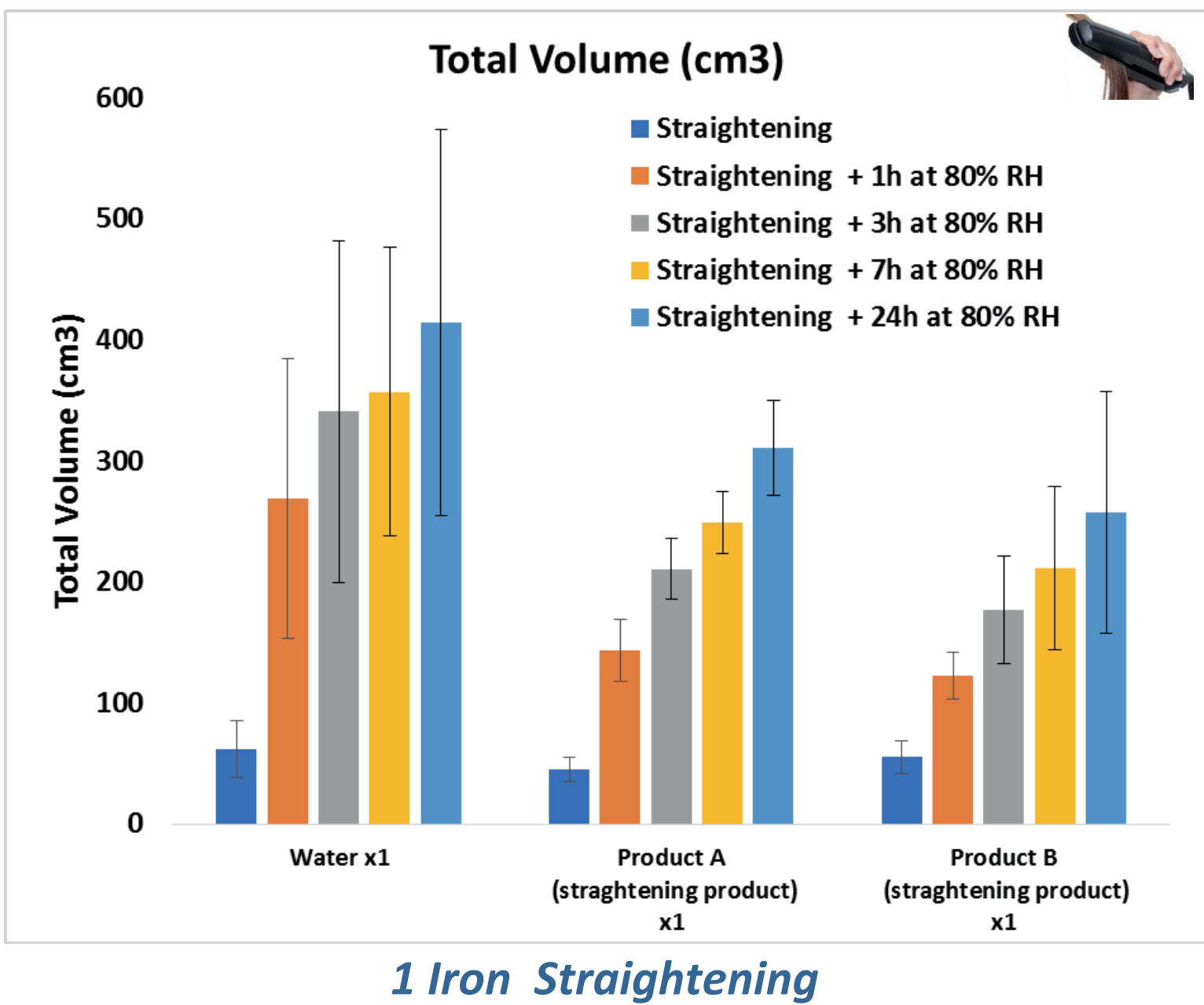


The volume and FAF generated by the neutral shampoo present the highest level. The smoothing shampoo and conditioner reduce significantly the volume and FAF compared to the surfactant shampoo. The impact of smoothing products (shampoo and conditioner) are obvious when they are combined.

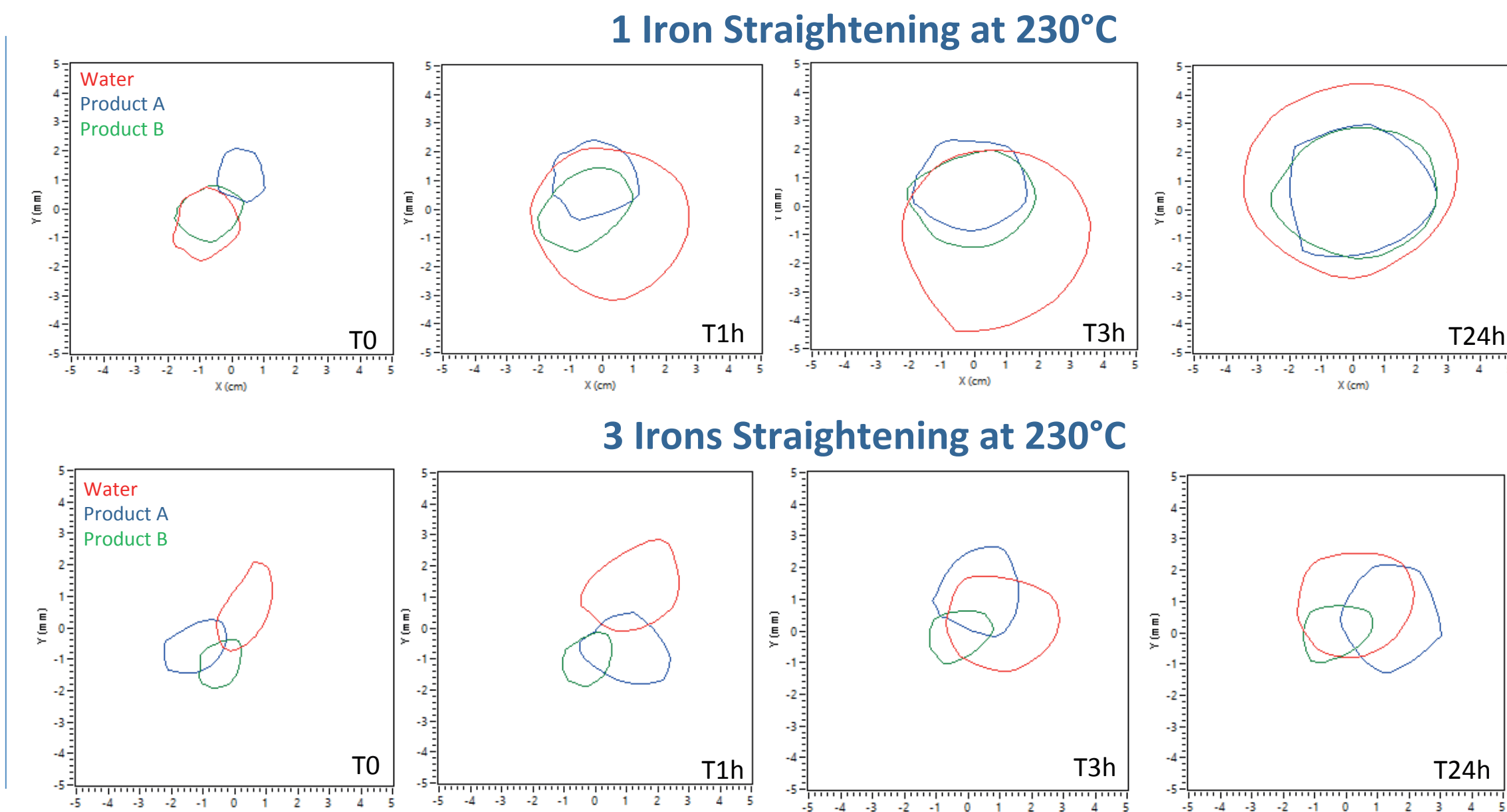
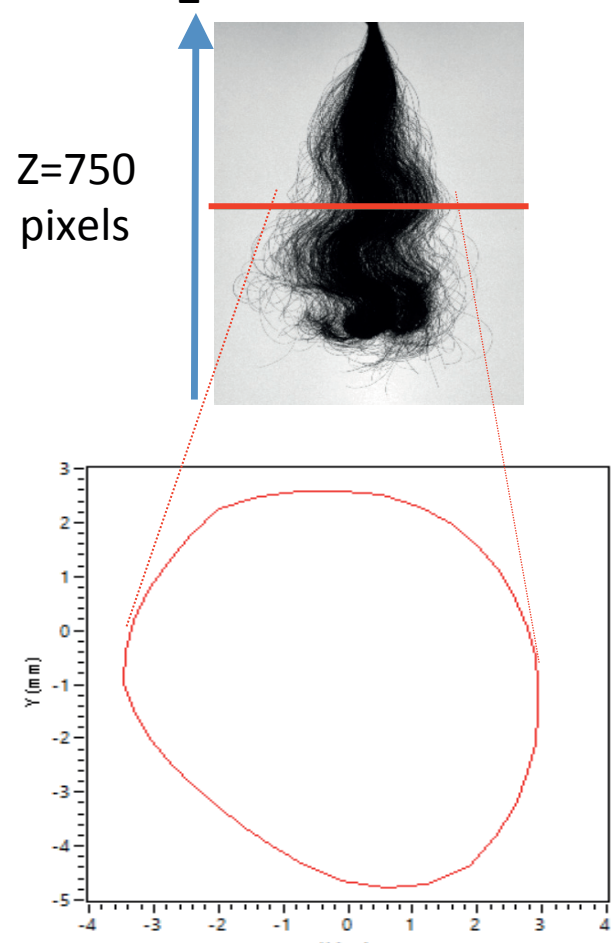
Neutral Shampoo < Smoothing Shampoo < Smoothing Conditioner < Routine

Impact of Iron Straightening Application on Hair Volume

- Hair: Wavy Caucasian Type III
- Treatment with 2 products after 1 and 3 Applications (Straightening at 230°C)
- Measurement after straightening and after 1h, 3h, 7h, 24h at 80% humidity.

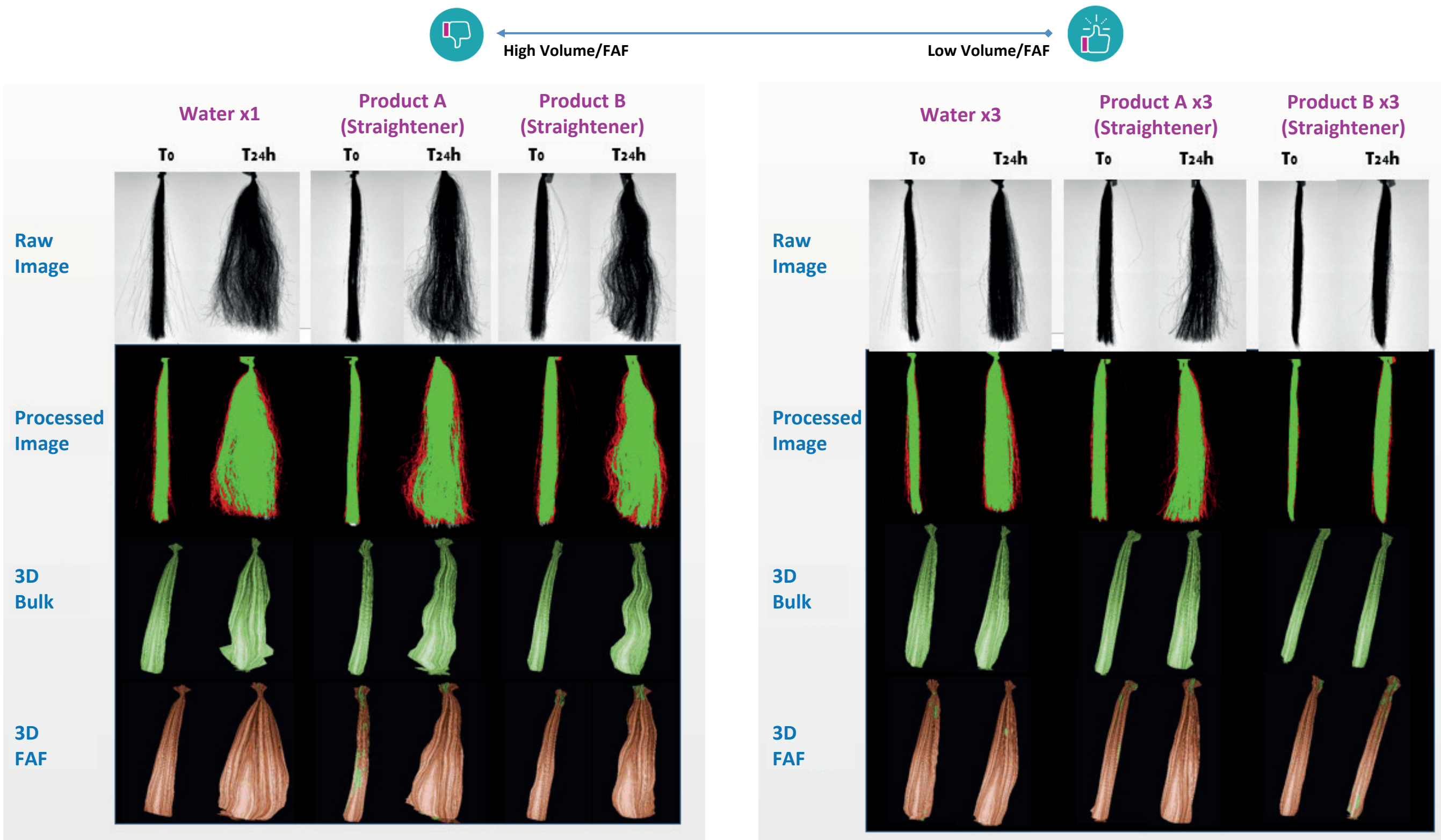


The cross section of the hair swatch is displayed and measured. A surface in cm² is calculated at a position chosen at z=750 pixels.



3 irons straightening reduce significantly the hair swatch volume compare to 1 straightening. After 1 and 3 irons straightening, the product B reduce significantly the hair swatch volume compare to water treatment and product A.

Water (x1 & x3) < Product A (x1 & x3) < Product B (x1 & x3)



Conclusion

This Bolero device allows to reconstruct the 3D volume of bulk and fly-away/frizz of hair swatches, leading to a 360° complete hair swatch analysis. Many representative parameters can be extracted (volume, flyaway/ frizz, bulk, cross section slices, images processed and 3D pictures...). We believe that this technique can be used for many applications in hair care product development and claim substantiation as shampoo, conditioner, serum, mask, oil, raw material, mask, hair spray/mousse, smoothing products and also iron straightening. In terms of claims, anti-frizz, discipline, loss or gain of volume or smoothing effect can be also studied.