

Peak fringe scanning microscopy applied to hair care product evaluation

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Objective

There are many methods¹ for evaluating the effectiveness of hair care products, depending on the property to be studied. Peak fringe scanning microscopy² (PFSM) has been used for decades for surface characterization in the industry. The objective of this research is to demonstrate the validity of this method for hair surface characterization.

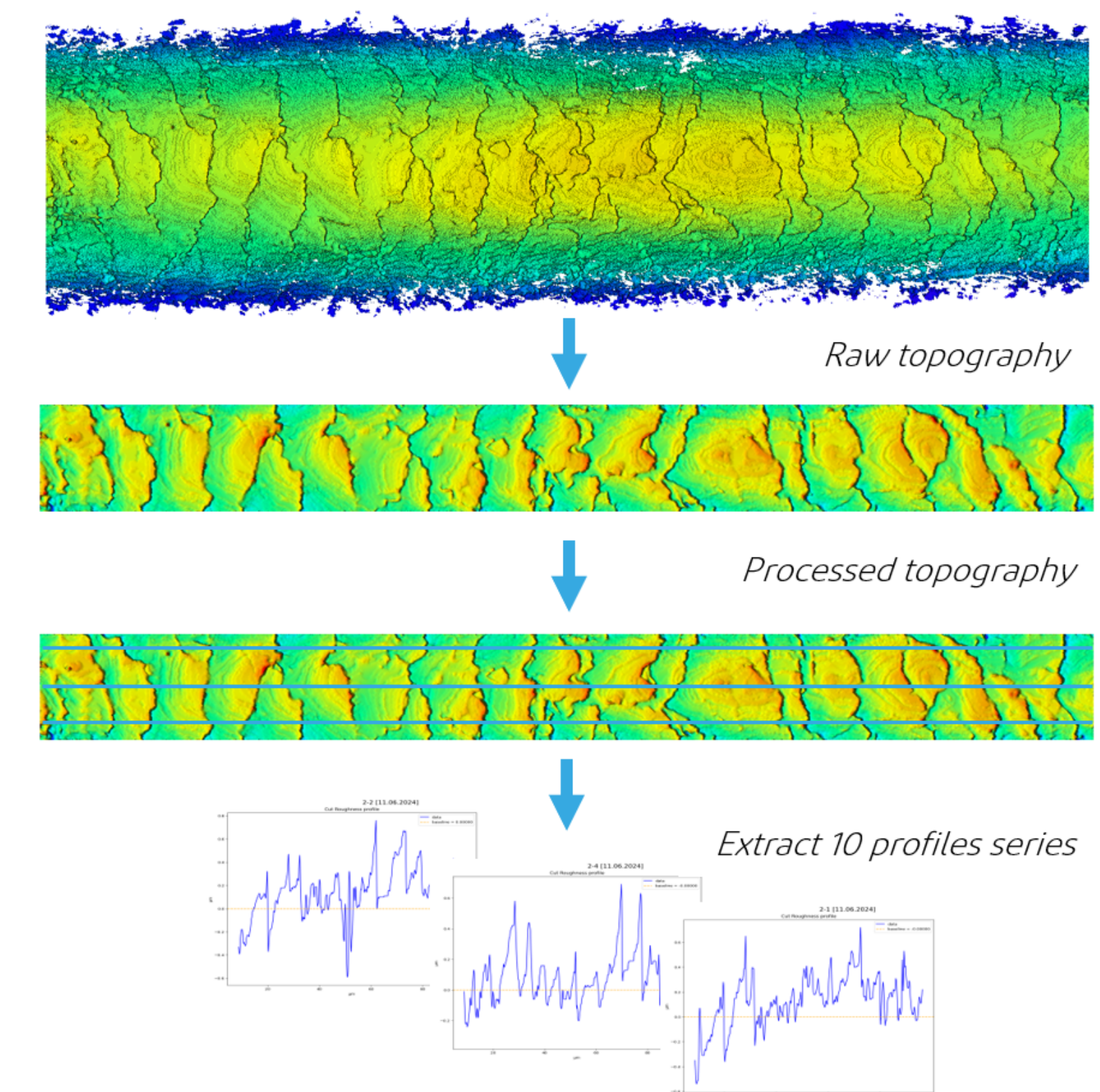
Method

MiniSURF, a full-field optical microscope interferometer based on a PFSM technique, is used to measure hair samples. 3 volunteers with different hair types took part of the evaluation.

A nourishing mask was applied after shampoo on wet hair 1 – 2 times per week. 3 bundles of hair have been collected from each volunteer: before treatment (T0), immediately after one product application and rinsing (T0imm) and after 28 days (T28). Data processing applied on all topographies: masking to get a surface of 150 μm x 15 μm, shape levelling, filter and cutoff to isolate the high frequency of the surface relief.

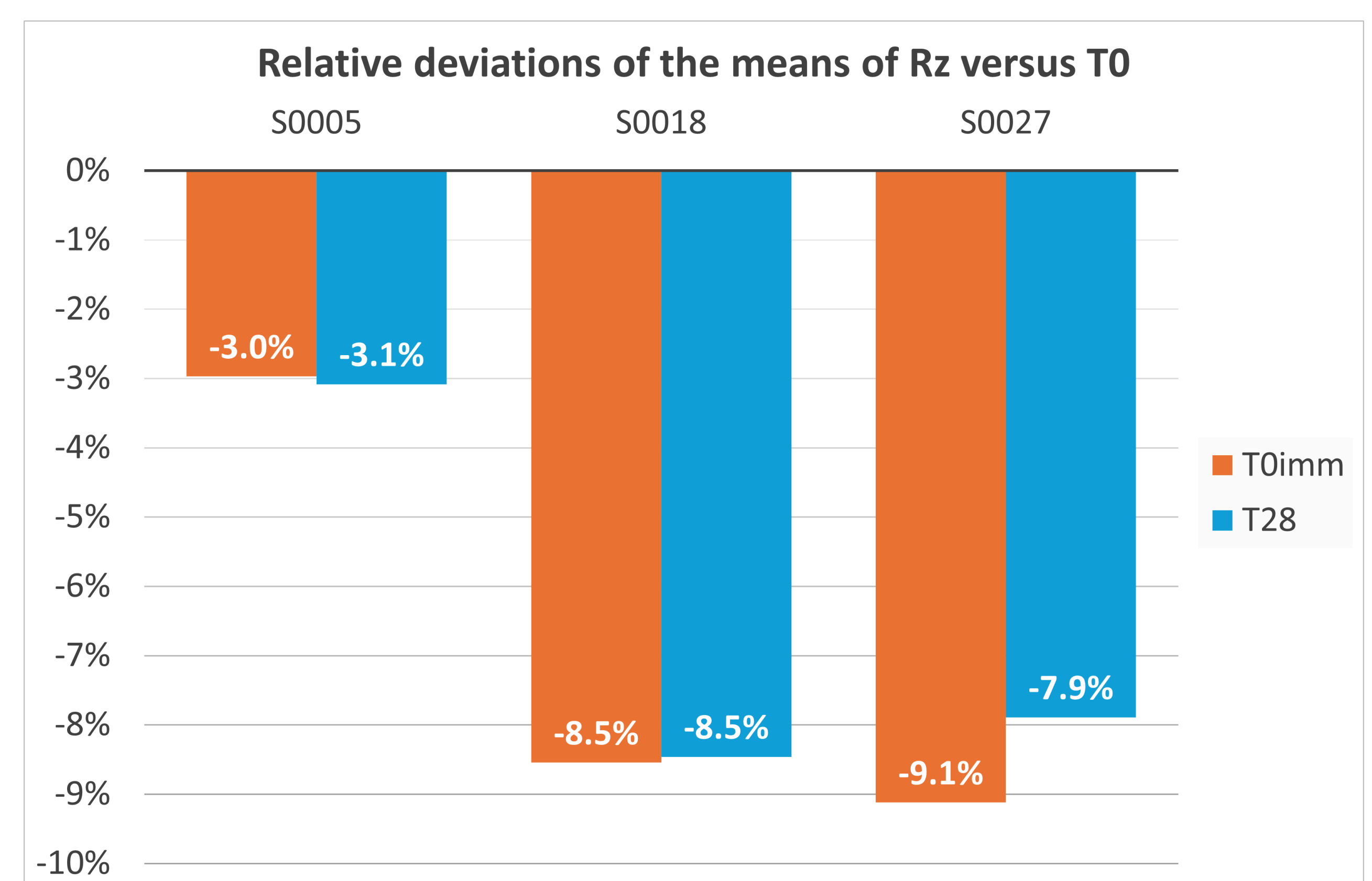
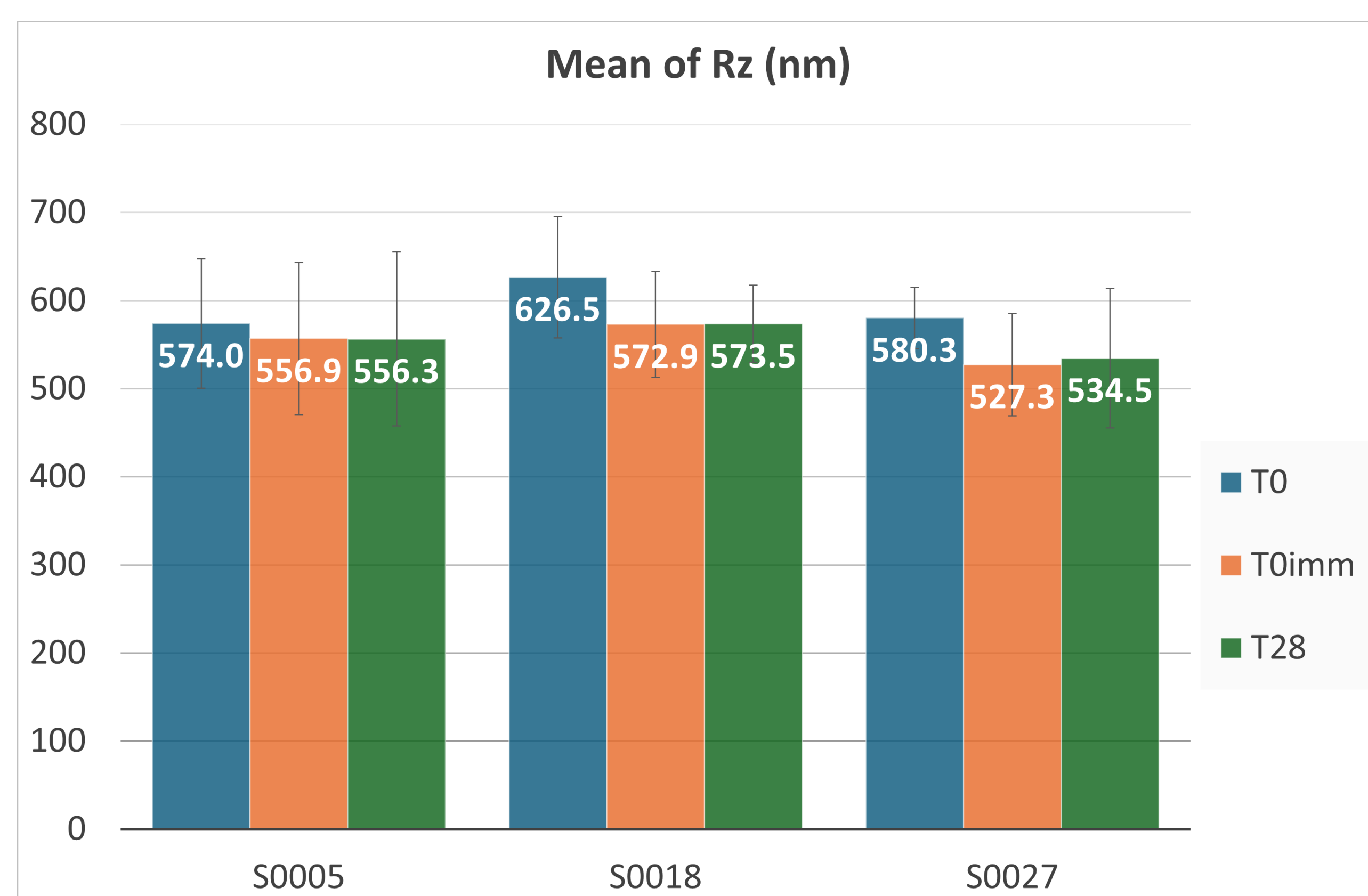
Roughness calculation of processed topographies: Extraction of 10 parallel profiles spread over the topography and calculation of Rz parameter (average maximum deviation from 5 subsampling of the profile).

The difference between baseline and treatment conditions and their average have been calculated for each volunteer.

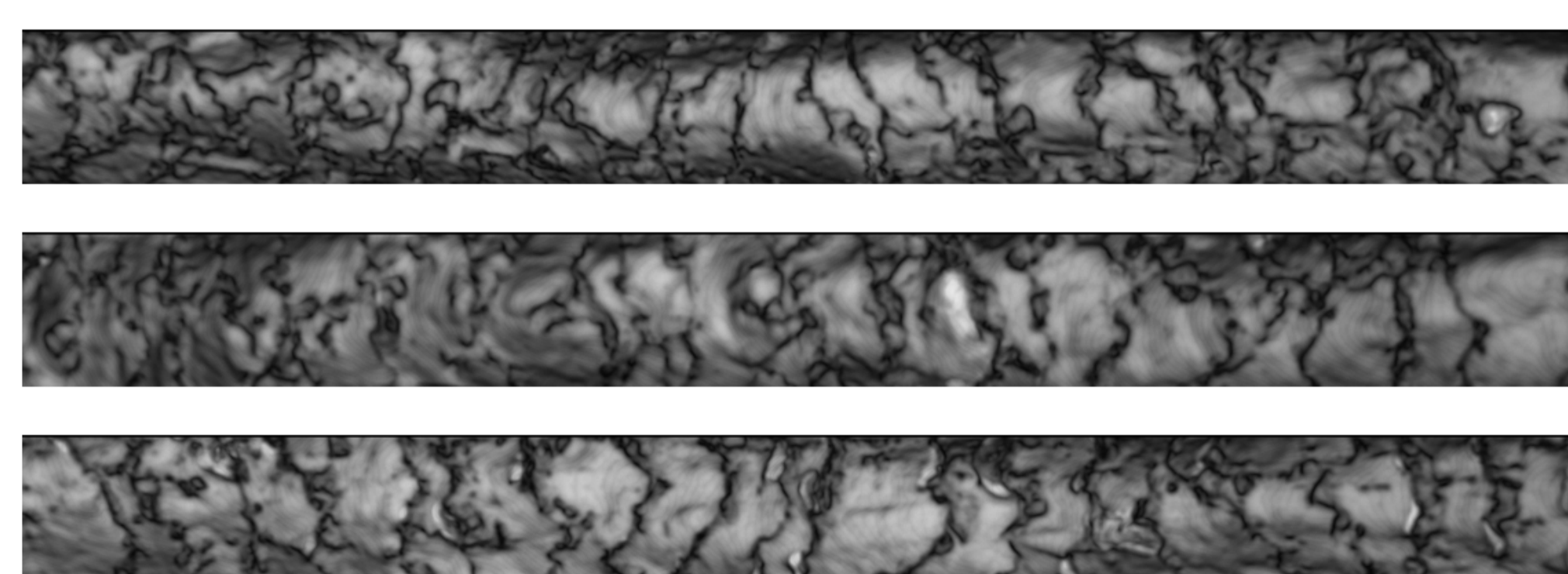


Results

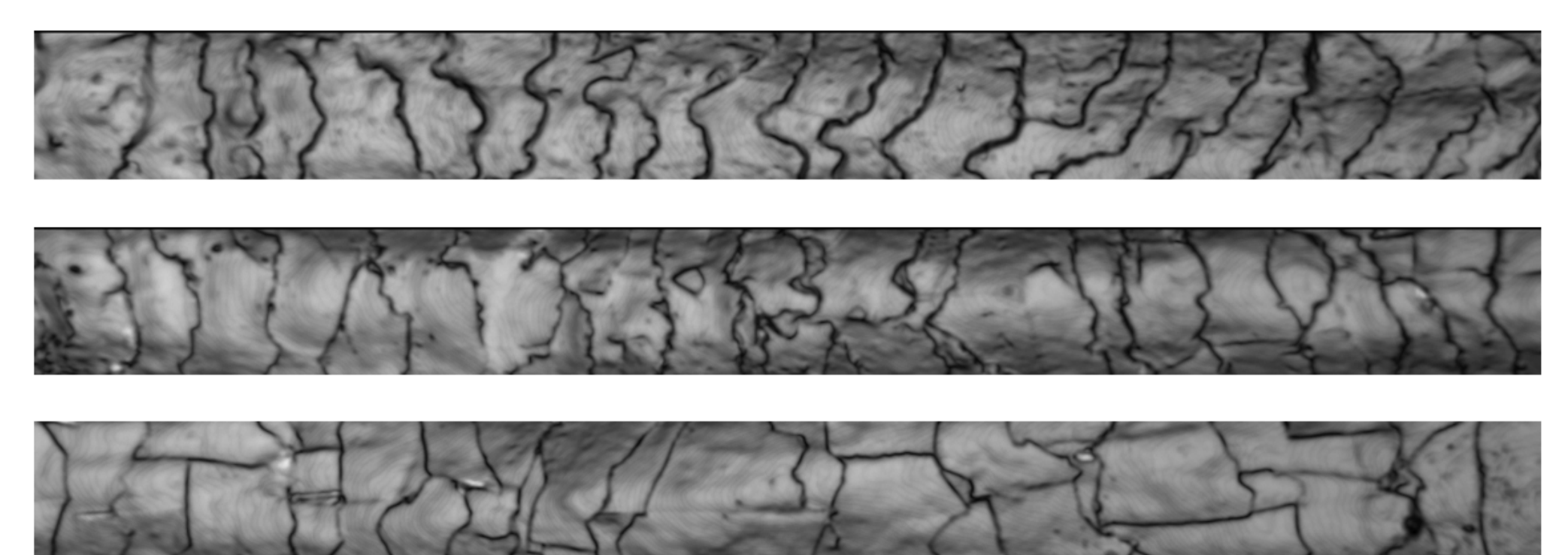
At T0imm and T28 roughness parameter Rz decreases of more than 8% for volunteers S018 and S027, 3% for volunteer S005. The smaller the roughness values, the smoother the surface, therefore the results show the hair surface is smoother after treatment.



A qualitative observation of the contrast images of hair generated by the device reveals smoother hair scales and less micro particles on hair surface.



Contrast images at T0



Contrast images at T28

Conclusion

The present work illustrates the potential of the peak fringe scanning microscopy to assess the efficacy of hair care products, particularly when the targeted claim is linked to hair smoothing.

It would be interesting to conduct a study on more volunteers of different hair types to measure the efficiency of the nourishing mask treatment according to hair types at a larger scale.

REFERENCES:

e.g. [1] Da Gama R. M., Baby A. R. and Velasco M. V. R., *Cosmetics*, 2017, 4(1):2

e.g. [2] Montgomery P. C. and Fillard J. P., *Interferometry: Techniques and Analysis*, 1993, 1755:12-23