



# The effect of Redbull® on human enamel surface

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## Aim:

- to measure the physico-chemical properties of Redbull® (pH and titratable acidity)
- to study the changes of the mineral content and microhardness of the enamel surface after exposure to Redbull®
- to study the remineralizing effect of saliva

## Experimental approach:

24 enamel specimens (4x3 mm) were randomly divided into 3 groups (control-A, Redbull®+saliva-B, Redbull®+deionized water-C). 16 specimens were exposed to 50 mL of Redbull® for 20 min after which 8 were submerged in artificial saliva (2h40m) and 8 in deionized water. The cycle was repeated 3 times a day for 7 days. The pH and titratable acidity of the beverage was measured. 4 specimens of each group were analysed with Raman Spectroscopy, 2 specimens with Vickers Microhardness tester and the remaining 2 were visualized with SEM.

## Results:

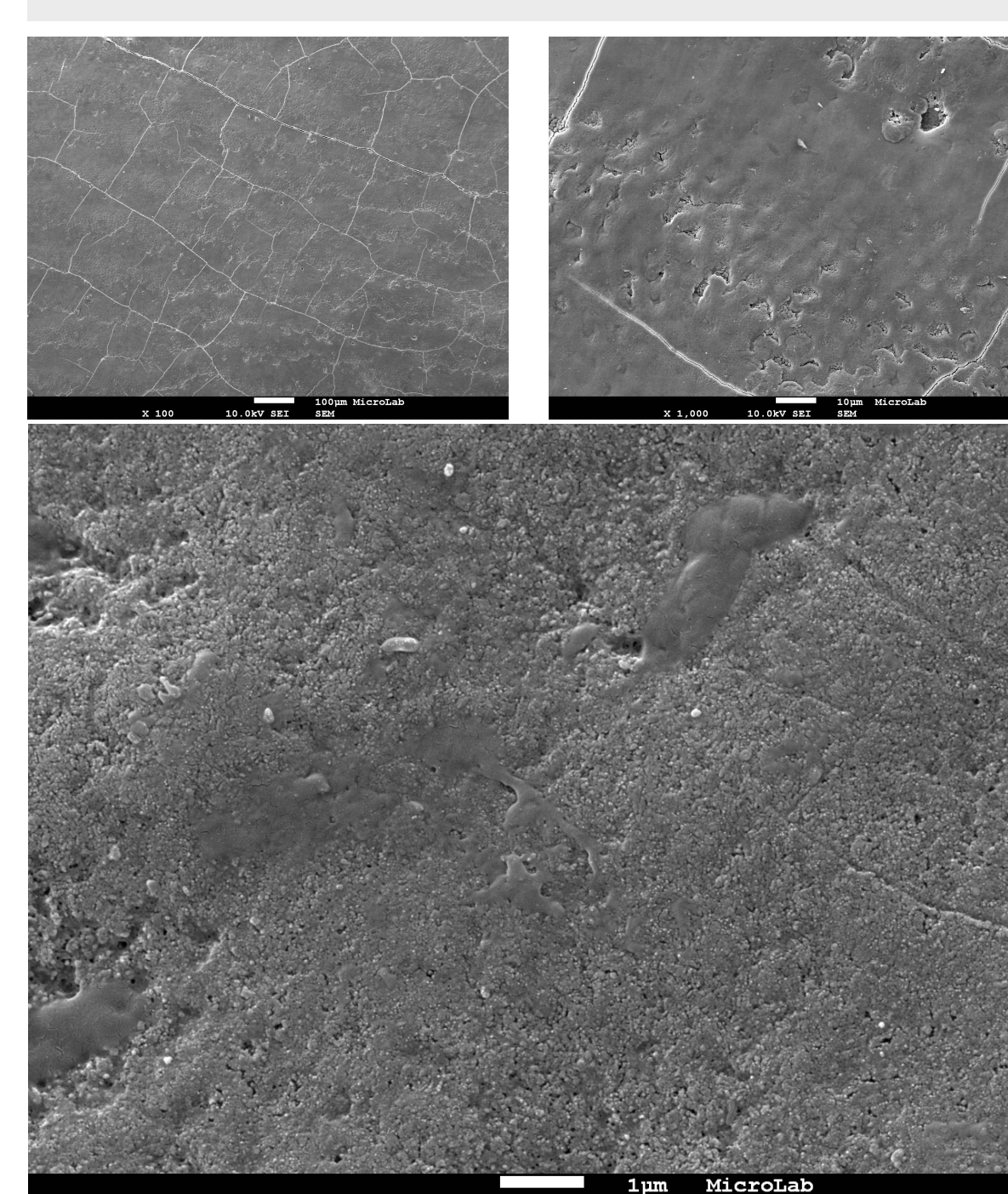
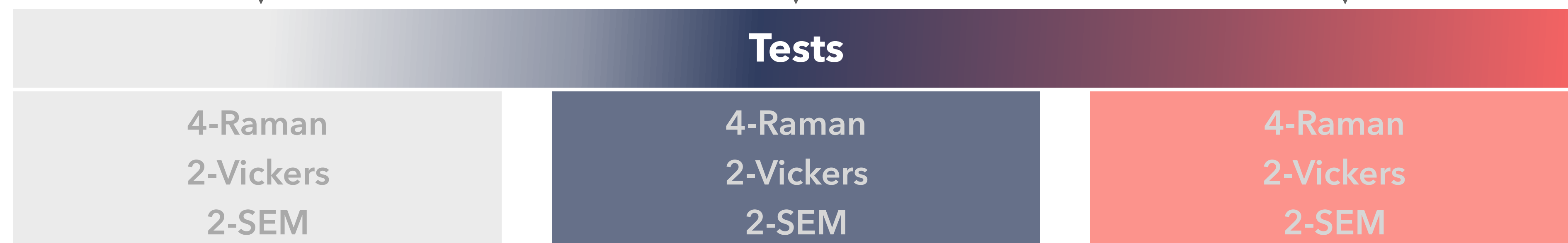


Fig.1 - Group A SEM, magnifications of 100x, 1000x & 10000x.

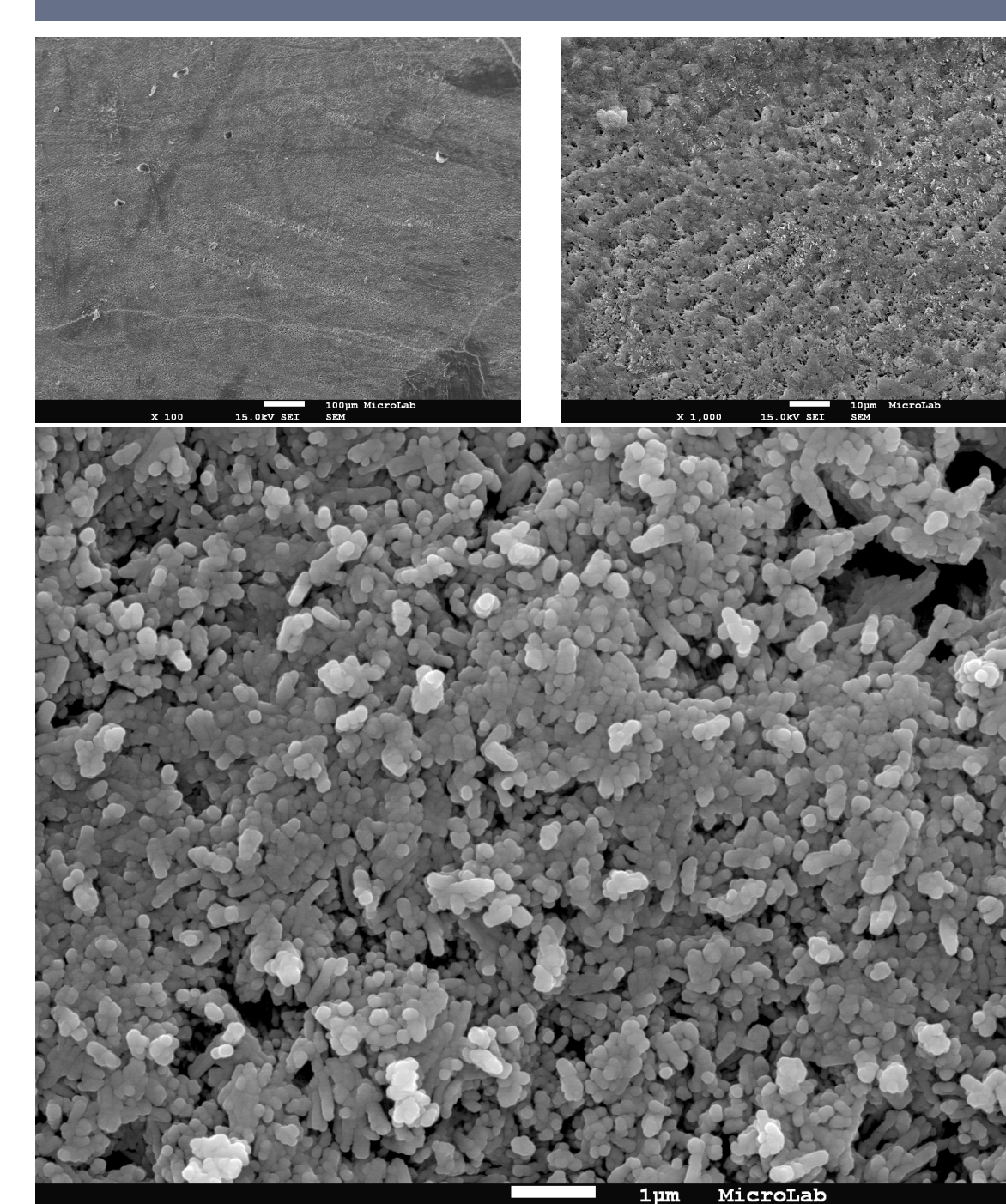


Fig.2 - Group B SEM, magnifications of 100x, 1000x & 10000x.

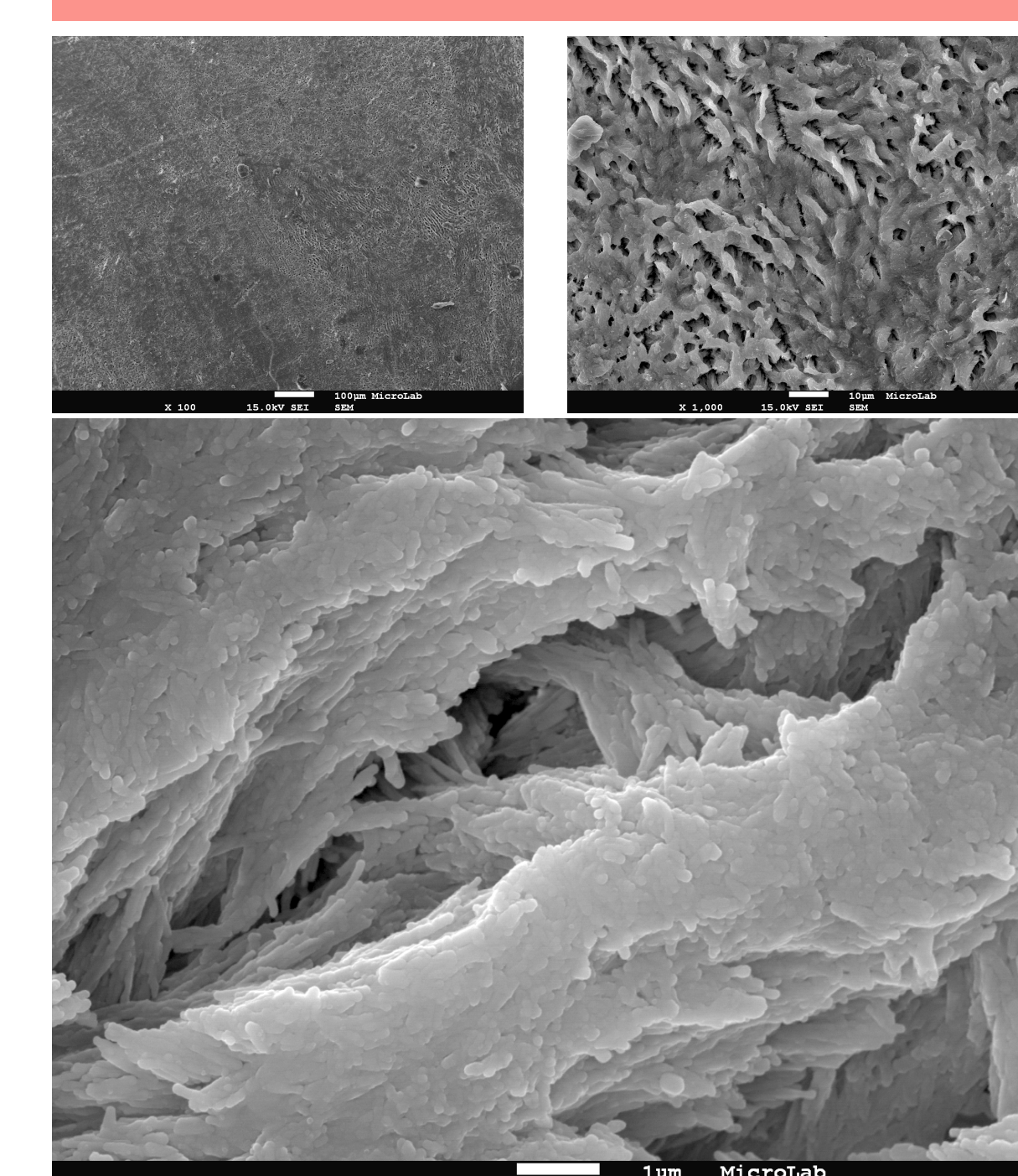
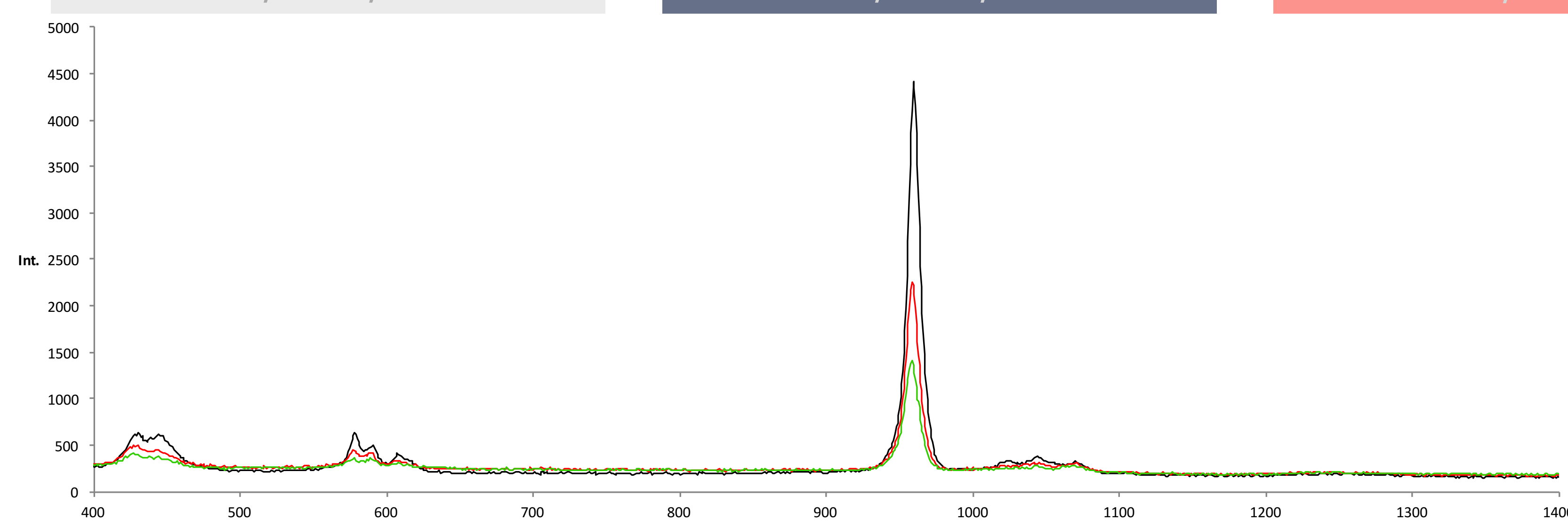


Fig.3 - Group C SEM, magnifications of 100x, 1000x & 10000x.

**Group A Vickers**  
345,5±24,7 HV

**Group B Vickers**  
305,1±48,2 HV

**Group C Vickers**  
250,3±30 HV



Graphic 1 - Raman espectroscopy representation of the 3 study groups

The data were statistically analysed by ANOVA using software SPSS with a significance level of  $p < 0,05$ . We found that the pH of Redbull® was  $3.49 \pm 0.096$  and 51 ml of NaOH (0.1M) was required for 50 ml of Redbull® to reach pH 7. In group C there was an increased carbonate/phosphate ratio with decreased microhardness. In group B were no such significant changes observed however all differences were statistically significant in all the 3 groups.

## Conclusion:

In conclusion Redbull® has a high erosive potential for the enamel, producing a loss of the mineral content and a decrease surface microhardness. Saliva has a protector/remineralizing effect when compared to deionized water.