Detailed assessment of donor xenomaterial by Raman spectroscopy

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INTRODUCTION AND MATERIALS

This article presents the results of spectral studies of xenomaterials obtained from different sources and at different degrees of demineralization. Samples of the mineral component of the bone were obtained from dental xenomaterials after demineralization in hydrochloric acid with a degree of normality of 1.8n, 2.4n. All studies were carried out using the method of Raman spectroscopy. As a result of the rThe objects of the study were groups of ICC samples made using the Lioplast® technology from the teeth of the Bos taurus cow (TU-9398-001-01963143-2004).Teeth for research were divided into 2 main groups according to the degree of demineralization in hydrochloric acid: group 1 - demineralized in 1.8 N HCl, group 2 - demineralized in 2.4 N HCl. In each group, cow molars and incisors were used to make Bone Mineral Component (BMC).Raman spectroscopy was used as the main method for studying xenomaterials. As an additional research method, a biochemical analysis of the concentration of calcium ions in the demineralizing solution was carried out.esearch, an extended analysis of xenomaterials was carried out in the process of their manufacture.

RESULTS

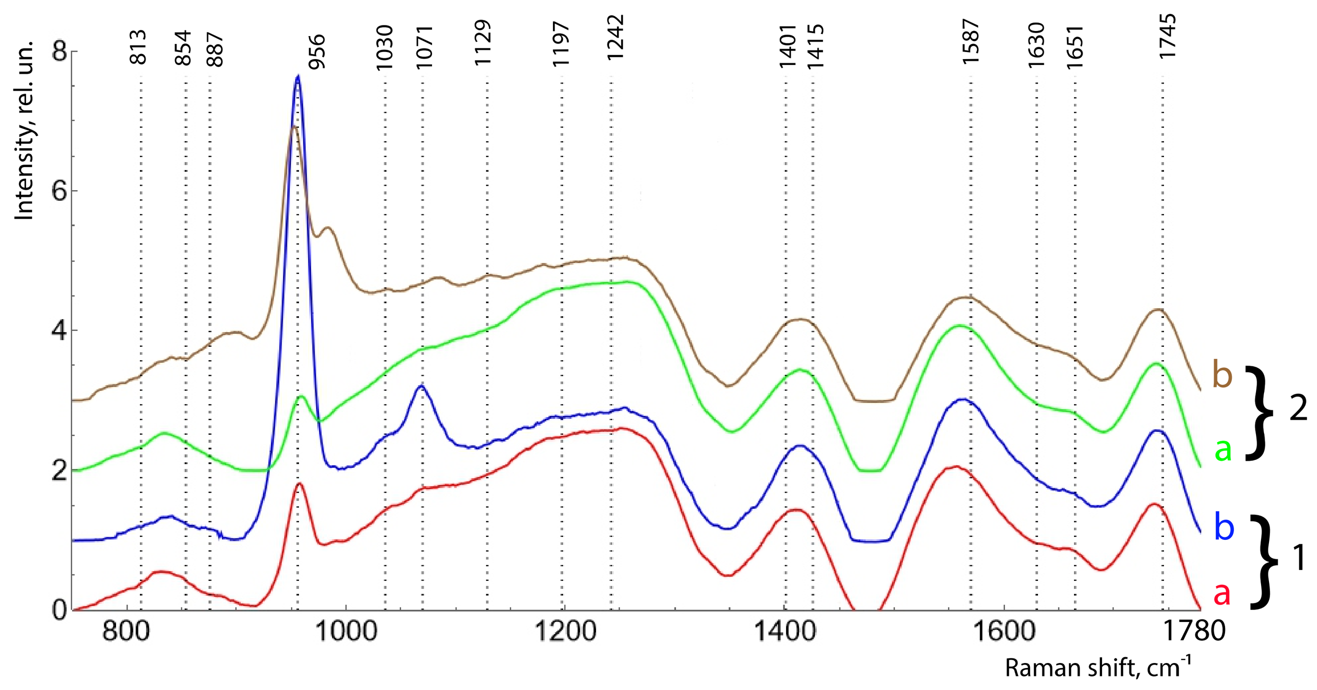

Figure 1. Averaged Raman spectra of xenomaterials obtained at the degree of demineralization: 1 - 1.8n and 2 - 2.4n; by origin a - Molar, b - Incisor.

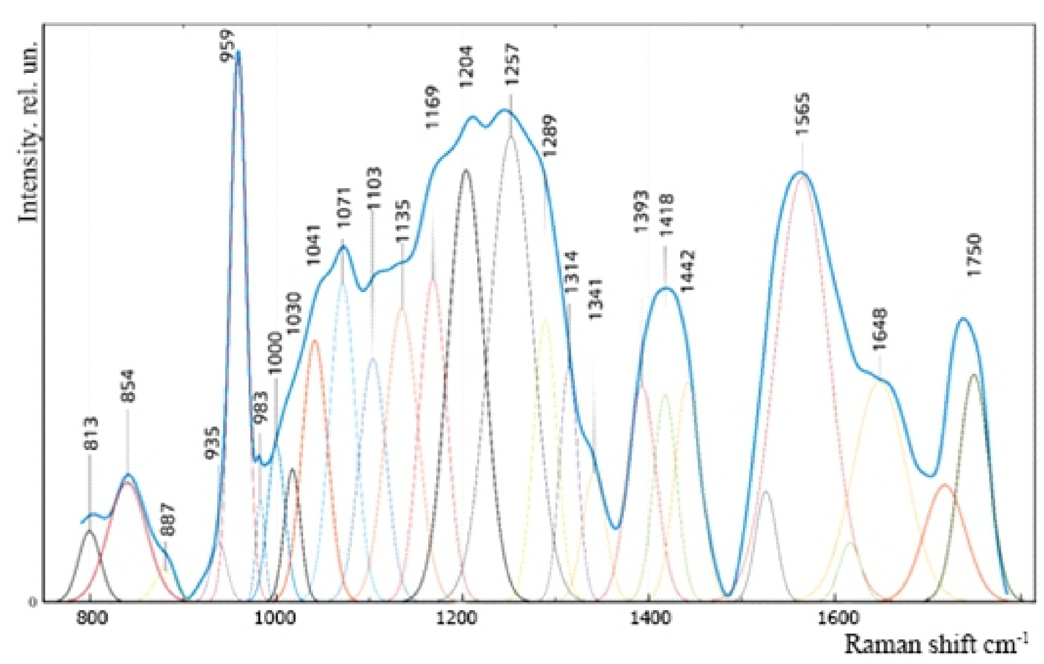

Figure 2. Spectral contour decomposition of the BMC samples

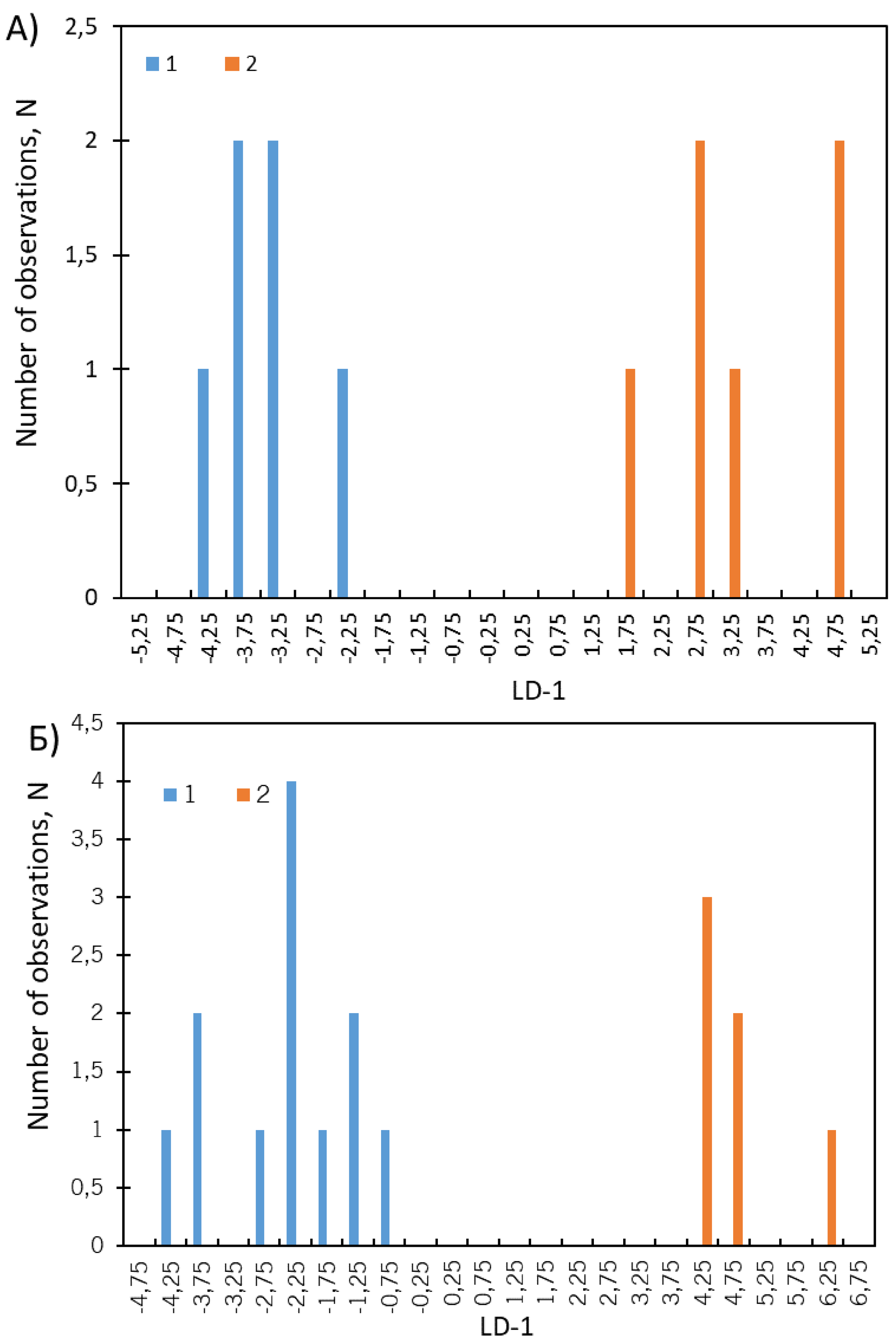

Figure 3. Graph of the values of the linear discriminant function of xenomaterial samples: 1 - Molars; 2 - Incisors. A) with a degree of demineralization 1.8n; B) with a degree of demineralization 2.4n

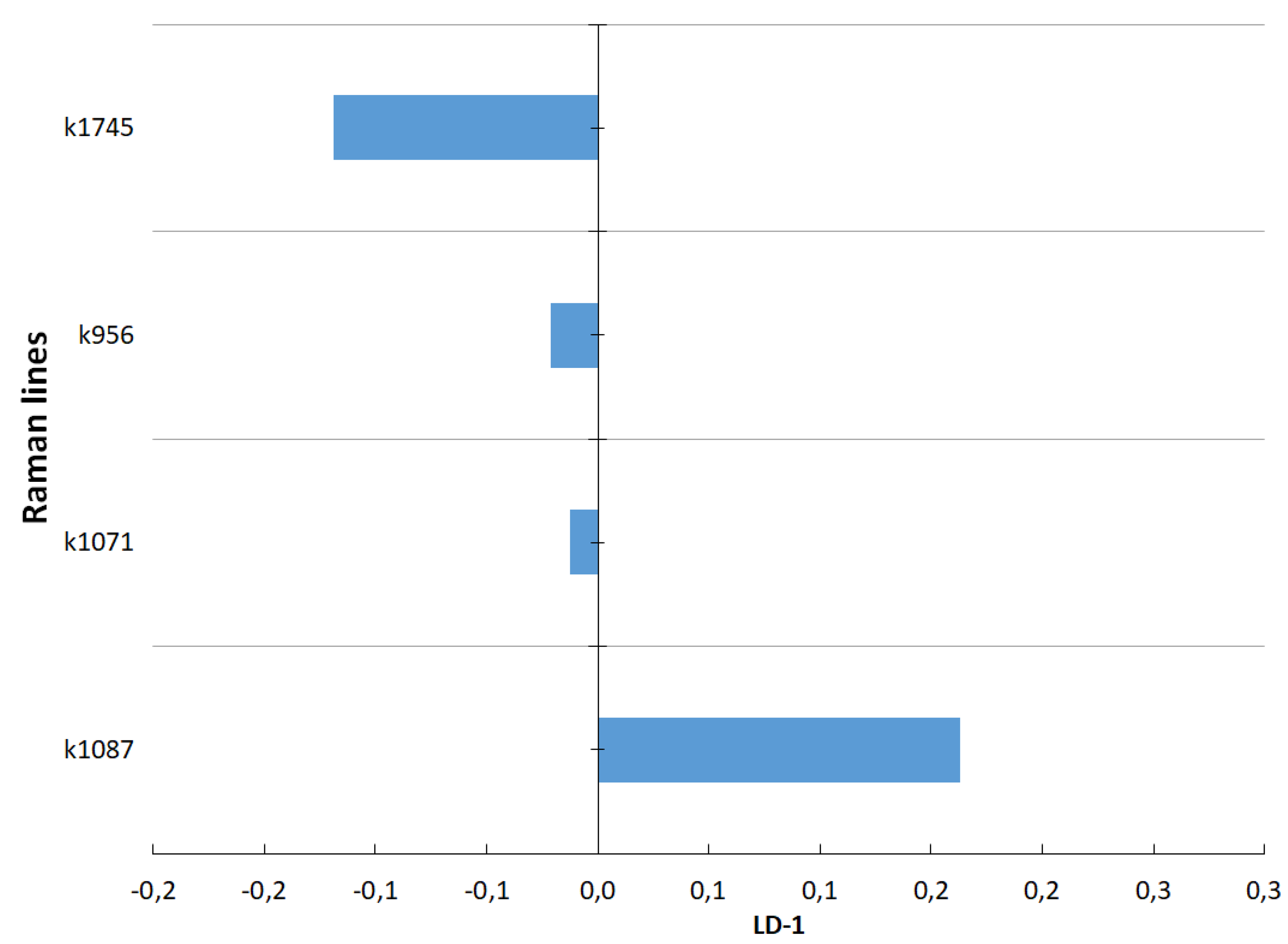

Figure 4. Factor structure coefficient values.

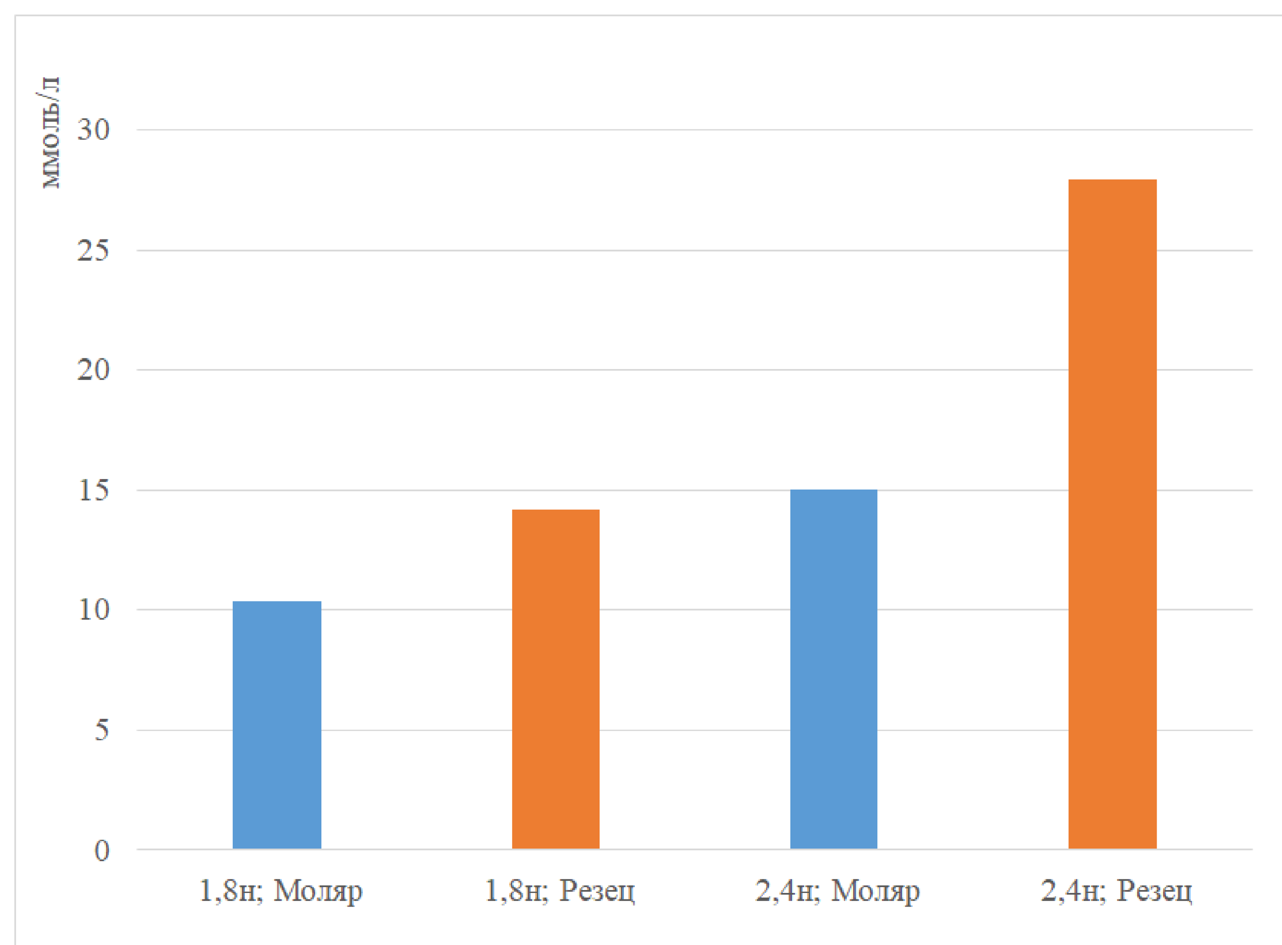

Figure 5. The concentration of calcium ions in the solution at the end of demineralization.

CONCLUSION

As a result of the research, an extended analysis of samples of xenomaterials was carried out in the process of their demineralization. Spectral changes in samples of xenomaterials at different degrees of demineralization have been established. It is shown that at a degree of normality of 2.4, complete demineralization of xenomaterials occurs, as evidenced by a decrease in the Raman intensity on the lines 956 cm^{-1} ($P0_4^{3-}$,P-O symmetrical stretching), 1071 cm^{-1} (CO_3^{2-},C-O planar stretching).Thus, using Raman spectroscopy, it was found that in the process of manufacturing the mineral component, it is preferable to use xenomaterials obtained from incisors, since the demineralization of molars occurs more slowly. The results were confirmed by biochemical analysis.