

### **Rietveld Analysis in Biological Apatite Composite Tissues**

Lauro Bucio<sup>a</sup>, Miguel A. Peña-Rico<sup>a</sup>, Irma Araceli Belío-Reyes<sup>b</sup>,

<sup>a</sup>*Departamento de Estado Sólido, Instituto de Física, UNAM, Mexico.*

<sup>b</sup>*Facultad de Odontología, Universidad Autónoma de Sinaloa, Sinaloa, Mexico. E-mail: bucio@fisica.unam.mx*

A Rietveld analysis has been carried out for two types of hard tissues: bone and dentin. As it is well known, both bone and dentin are composite materials having the presence of an organic matrix (type I collagen) and nanometric crystals of biological apatite. In Rietveld Refinement, the description of the Bragg intensity peaks can be carried out without serious difficulties. In any case, the microstructural contribution must be settled carefully, by introducing an instrumental resolution function. In the correction for absorption we have taken into account the contribution for air scattering, according to Ottani et al. [1]. As part of the background, we have considered the incoherent scattering using the analytical expression published by Smith et al. [2] and the thermal diffuse scattering [1]. The amorphous contribution has been described using the scattering of a pure amorphous collagen, and the Debye equation. This possibility is available in program FULLPROF [3] in which we have used six terms to fit the collagen contribution to the background. The possibility of perform a quantitative analysis in this kind of composite materials is analyzed. A structural study of several biological apatites from bones of humans and animals is presented.

[1] Ottani S., Riello P., Polizzi S., *Powder Diffraction*, 1993, **8**, 149-154. [2]

Smith V. H., Thakkar A. J., Chapman D. C., *Acta Cryst.*, 1975, **A31**, 391-392.

[3] Rodríguez-Carvajal J., Roisnel T., FullProf.98: New Windows 95/NT Applications for Diffraction, *Newletter N°20*, 1998.

**Keywords: Rietveld analysis, biological apatites, amorphous compounds**