ESRF

	Experiment title: Bone like collagen matrices, from the setting up to their bio mineralization	Experiment number: SC2172
Beamline: ID02	**Date of experiment**: from: 28/06/07 to: 01/07/07	**Date of report**: 02/08
Shifts: 9	**Local contact(s)**: P. Panine	*Received at ESRF:*

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Report:

This experiment was designed to study the mechanisms by which dense ordered collagen fibrillar gels (mimcking the 3D organization in bone) can be mineralized using biomimetic methods, namely at moderate temperatures ($<37°C$) and in physiological physicochemical conditions. In every case we were careful to prepare collagenous materials with a specific long-range organization, either uniaxial or chiral.

We focused on three mineralization methods, all performed at room temperature. The first one consists in the double diffusion, from opposite sides of the gels, of phosphate (A) and calcium (B) ions, while keeping the pH at a physiological value. The second method involves impregnation of the gels with a metastable solution of both ions. In a third one, collagen and mobile ions were mixd before the pH was raised to induce co-precipitation.

The combination of SAXS and WAXS detections was used successfully to characterize simultaneously the gel fibrillar structure, in particular the typical 67 nm- periodicity, and the nature of the mineral phase.

The three methods yielded mineralized collagen samples in many conditions. In some cases the mineral phase is hydroxyapatite, the mineral phase of bone, and correlations with collagen orientation have been found The results are currenty being used to write a patent application, and therefore cannot be reported in more details at the present.