	Experiment title: SAXS investigation of collagen-chondroitin sulphate complexation /Distribution of transition metals in carbon aerogels	**Experiment number**: **02-01-773**
Beamline: BM2	**Date of experiment**: from: 30-04-2009 to: 04-05-2009	**Date of report**: 25-08-2010
Shifts:12	**Local contact(s)**: Cyrille Rochas	*Received at ESRF:*

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Report:

This beam allocation was attributed to two proposals, SAXS investigation of collagen-chondroitin sulphate complexation (02-01/773) and XAS of transition metal ions in microporous carbons (CH 3136).

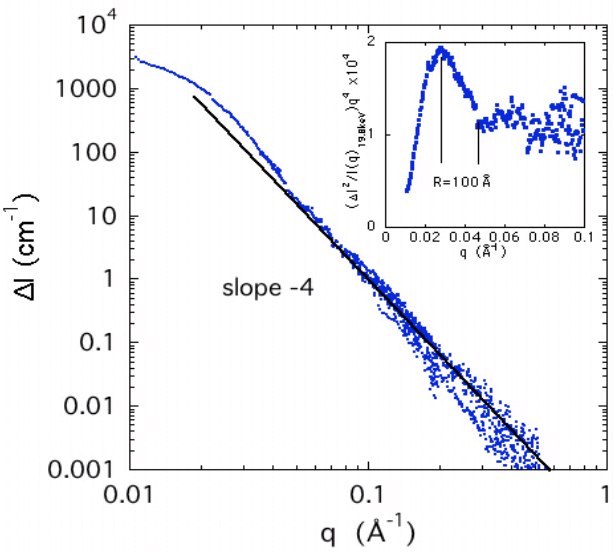

Figure 1: Difference spectrum of Mo-containing RF network at 19.800 and 19.994 keV. Slope of continuous line -4. Inset: normalized difference spectrum $\Delta I(q)^2/I(q)$ where $I(q)$ is the reference measurement at 19.800 keV, in the representation $q^4\Delta I(q)^2/I(q)$ vs q. The vertical lines are the positions of the first maximum and minimum for a sphere of radius 100 Å.

XAS measurements were made in two energy ranges, around 8.9 keV for copper-bearing carbons, and around 19.9 keV for Mo-bearing samples. In the latter case the difference signal, $\Delta I(q)$, between the intensity at 19.8 keV and that at 19.994 keV, displayed surface scattering from smooth objects having a radius of gyration R_G~103 Å. On being plotted in the representation Iq^4 vs q, the outer radius R of the spherical deposits was also found to be close to 100 Å (Figure 1). The almost identical values of R and R_G imply that the molybenum compound takes the form of a smooth shell on the outside of the polymer beads that constitute the polymer network [1].

For the collagen-chondroitin sulphate system, the measurements reveal a small deviation from additivity of the spectra in the q range 0.01-0.02 $Å^{-1}$ corresponding to mutual repulsion. In the high q range, Figure 2 shows that the water molecules in the vicinity of collagen have a different structure from that of bulk water, unlike the case of aggrecan (of which chondroitin sulphate is the majority component) [2]

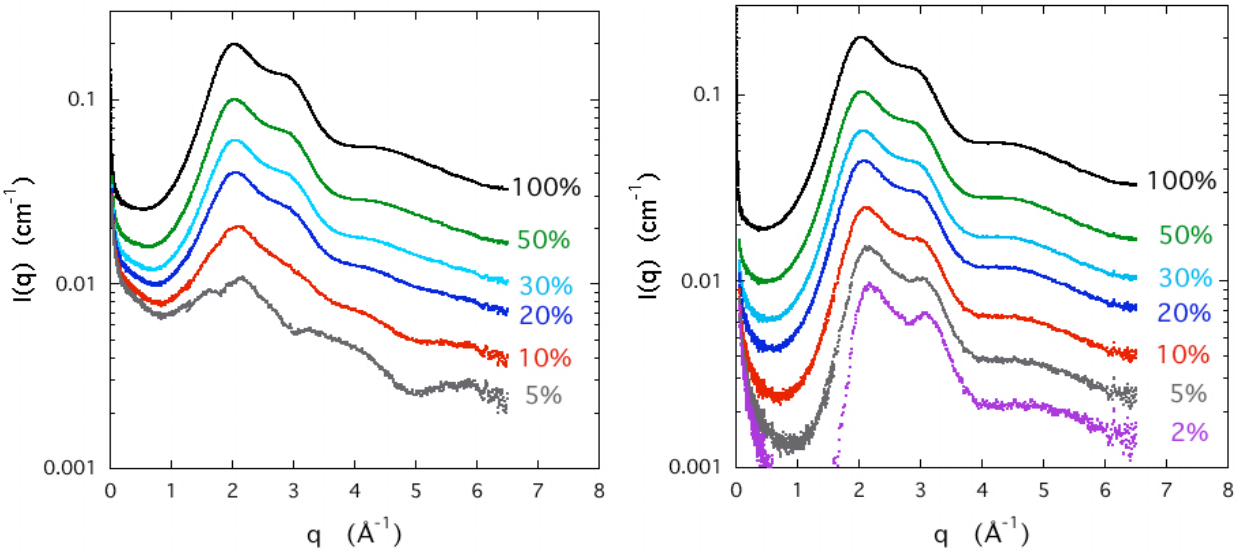

Figure 2. Comparison of scattering in the large q range of collagen (0.2%) (left) and aggrecan (0.1%) (right) solutions in water, when different fractions of the signal of pure water are subtracted. The structure of the residual water around collagen differs strongly from that of pure water, while that arround the aggrecan remains similar.

[1] K. László, B. Nagy, A. Toth, E. Geissler (in preparation)
[2] Length scale dependent interactions between the principal macromolecular constituents of cartilage: collagen and aggrecan
F. Horkay, P.J. Basser, A.-M. Hecht, E. Geissler (in preparation)