NanoMEGAS
Advanced Tools for electron diffraction

Background

It is known that in amorphous materials crystalline order exists only at short range scale and conventional X-Ray diffraction does not bring structural information as there is lack of clear Bragg reflection peaks. Pair distribution function analysis (PDF) from total scattering experiments can be used to understand the type of ordering present in these types of compounds ; this can be done usually with conventional Mo/Ag X-Ray diffraction or using Synchrotron facilities. As an alternative, PDF analysis based on electron diffraction in any transmission electron microscope (TEM) can be used to study local order. The main advantages of using electron diffraction for PDF analysis is the very quick data acquisition time (from few msec to 2-3 minutes per ED pattern) and possibility of probing small nm size areas.

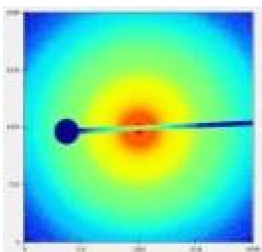
Objectives

The workshop will provide an opportunity to learn how to analyze different diffracting systems (nanoparticles, amorphous glasses , minerals , pigments etc..) using TEM electron diffraction PDF techniques. Software to analyze PDF will be demonstrated (PDFgetEGui) following practical hands-on session with limited number of participants (30).

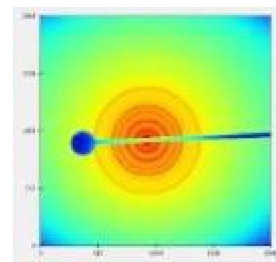
Emphasis will be given to discuss scientific problems between participants and invited specialists.

PDF for amorphous and nanomaterials

amorphous



Electron Diffraction data collected in 2D Detector

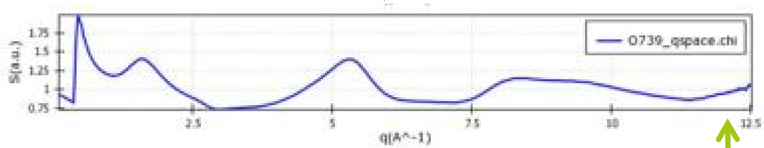


Nanomaterial

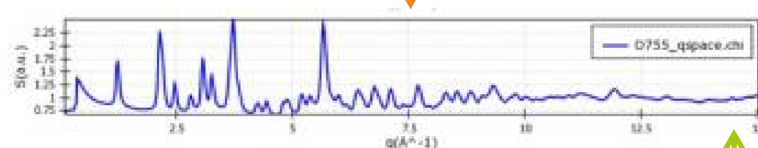
Corrected and Integrated data in 1D to obtain I Vs Q

Normalization to calculate S(q)

Normalization to calculate S(q)



Qmax for FT



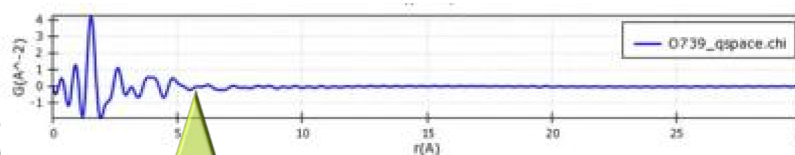
Qmax for FT

PDF

Fourier transformation

PDF

Fourier transformation



Short range order

Long range order

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