Radio and Space Plasma Physics
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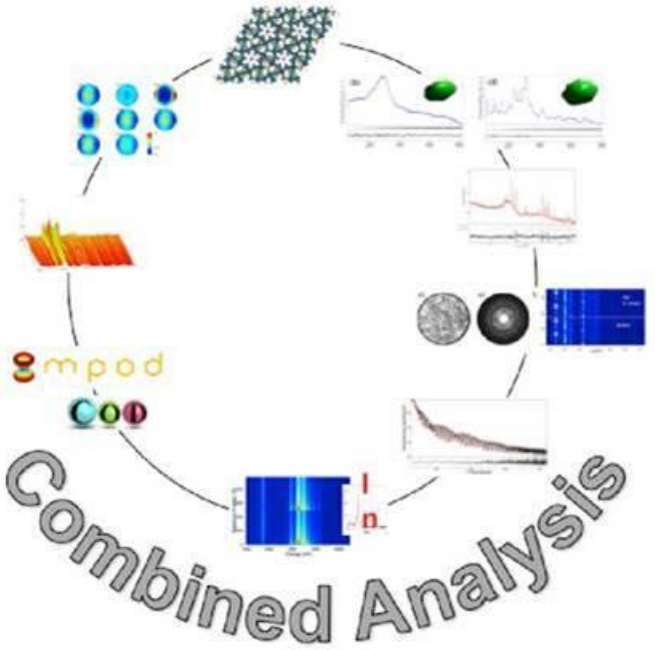
ABSTRACT:



Combined Analysis: a global approach for characterization using ray scattering: structure, texture, stress, nanocrystals, phase, reflectivity, fluorescence …

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The Combined Analysis methodology uses ray scattering (x-rays, neutrons, electrons). It proved its efficiency in particular to characterize real materials non destructively. Not only it avoids false minima in the refinements when e.g. texture or structure is the only targeted aspect,

but it also allows to benefit from anisotropies in real samples rather than to suffer from them during characterizations.

In Combined Analysis a global algorithm in a single software enables the characterization of many different aspects of the material: crystallographic texture, residual stresses, structure, phases, crystallite defects (sizes, shapes, microstrains …), layering (layer thicknesses, roughnesses …), elements … **X-ray, neutron and electron scattering experiments** can also be combined, together with x-ray fluorescence and x-ray specular reflectivity, using a lot of different scattering setups.

After a general overview of the Combined Analysis potentialities, we will illustrate its capabilities using several examples:
- texture, microstructure (anisotropic nanocrystal sizes and microstrains), structure, residual stresses, phases on complex examples of thin structured layers using **x-ray diffraction, including x-ray fluorescence in grazing mode**
- nanocrystal characterization using electron TEM Debye-ring patterns
- texture of geological materials using neutron scattering
- structural distortions in mollusc shell biominerals

before going to some milestones about future developments.