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## SEM AND $\mu$ -RAMAN CHARACTERIZATION OF ELECTRON BEAM DAMAGES ON FLUOR-APATITES - IMPLICATION FOR EPMA ANALYSIS

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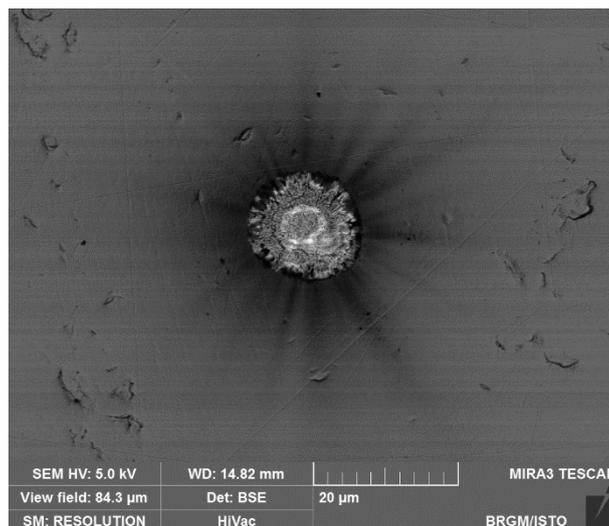
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Apatites are phosphate minerals of a general formula  $\text{Ca}_5(\text{PO}_4)_3(\text{OH},\text{Cl},\text{F})$ . They are the principal constituent of teeth and bone (natural and synthetic); represent an important accessory mineral in volcanic geological environment by means of a storage of elements such as halogens, sulphates, carbonates, Sr and REE; represent a packaging of radionuclides for nuclear waste, trapping heavy metals and finally are mostly used fertilizers.

This work is focused on fluorapatite, the Fluorine-rich composition. As mentioned by several authors, SEM and EPMA analysis of F-apatites is complicated by the strong consequences of electron beam damages. This problem is particularly strong for the determination of fluorine concentration. Indeed a complex intensity variation is observed for the fluorine signal collected by the spectrometer; this variation mainly depends on two parameters: crystal orientation of the mineral grain and electron beam setup.

Crystallographically-oriented Fluor-apatite were irradiated under the EPMA electron beam, using different setup (i.e. acceleration voltage, beam current, beam size) following the F, Ca and PWDS-variations signal. Beam damages were characterized by SEM and  $\mu$ -Raman (including Raman-in-SEM).



SEM image of the damage caused by irradiation of a F-apatite with the electron beam oriented  $\parallel$  to the crystallographic c-axis.