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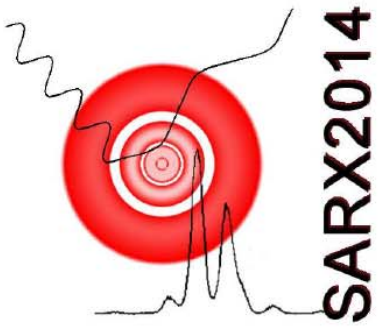

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MULTIVACANCY SATELLITES STRUCTURES OF X- RAY EMISSION SPECTRA OF FLUORINE IN LANTHANIDE MATERIALS

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The fabrication of rare earth fluorides and the study of their physicochemical properties is subject of current research. Lanthanide fluorides are widely used in many fields, such as telecommunication, lasers, new optoelectronic devices and diagnostics [1].

We analyzed the X-ray emission spectra of synthetic lanthanide fluorides (LaF_3, CeF_3, PrF_3, NeF_3 and EuF_3) to investigate the relation between the characteristic feature of the spectra and the electronegativity of the different ligands of rare earth in these fluorides. The experimental data were obtained by means of electron impact,thespectra were recorded using a Wavelength Dispersive Spectrometer (WDS) that is coupled to a Scanning Electron Microscope, inthe *Laboratorio de Microscopía Electrónica y Microanálisis* of the *Universidad Nacional de San Luis* (Argentina).

At higher energies than F-$K\alpha_{1,2}$we found the satellite structureKL^1 consisting of lines (in increasing order of energy value) $K\alpha'$, $K\alpha_3$ and $K\alpha_4$. At even higher energies we also observed satellite lines by triple ionization (KL^2), called $K\alpha_5$ and $K\alpha_6$[2].

We found that the KL^n(n=1, 2) satellite intensity in fluorides has a close relation to the electronegativity of the neighboring atoms of the x-ray emitting fluorine atom. This is because the KL^n satellite is stronger for ionic compounds than it is for covalent compounds: The valence electrons are delocalized for covalent compounds, thus the perturbation due to the creation of the core-hole is small for said compounds. Consequently, for the ionic compounds, the valence electrons are localized, thus the perturbation due to the core-hole creation is large. Therefore, the satellites structures are strong for the ionic systems studied. So we could determine the ionicity of these lanthanide fluoridesand the localization of valence electrons by measuring the intensities of the multivacancy satellites structures of their x-ray emission spectra.

Keywords: Lanthanide Fluorides; Multivacancy SatellitesLines; X-Ray Emission Spectrum

References

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