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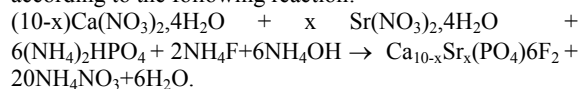
MS17 P16

Substitution effect on the structure of apatite ($\text{Ca}_{10-x}\text{Sr}_x(\text{PO}_4)_6\text{F}_2$, $x = 0, 4, 6, 10$) Fatima Zahra Boujrhah^{a,b}, Bouchra Sghir^b, Rajaâ Cherkaoui El Moursli^b, El Kébir Hlil^c, Abdelaziz Laghizil^d, ^aDepartment of Physics, Faculty of Sciences and Technologies, Beni Mellal, Morocco. ^bLaboratory of Nuclear Physic, Faculty of Sciences, Rabat, Morocco, ^dLaboratoire de Chimie-Physique Générale, Faculté des Sciences, Rabat, Maroc, ^dLaboratory Chemistry-Physic, Faculty of Sciences, Rabat, Morocco, ^cLaboratoire de Crystallographie, Grenoble, France. E-mail: boujrhah@yahoo.fr

Keywords: apatite, pollutants, structure

The apatite is known to be an ideal material for long-term containment pollutants (stables: heavy metals and radioactifs) because of its high sorption capacity for actinides, fission products and heavy metals, low water solubility and high stability to heat treatment and to irradiation. In this work, we study the effect of substitution of the strontium (fission products) on the apatite structure. This stable element is the isotope of the one of product fission

The synthesis of Solid solution $\text{Ca}_{10-x}\text{Sr}_x(\text{PO}_4)_6\text{F}_2$ are synthesized by wet process. This method consists in pouring 0.1 moles of an aqueous solution [(10-x) $\text{Ca}(\text{NO}_3)_2 \cdot 4\text{H}_2\text{O}$ et x $\text{Sr}(\text{NO}_3)_2 \cdot 4\text{H}_2\text{O}$] on a soluble phosphate solution (7.92g of $(\text{NH}_4)_2\text{HPO}_4$) added ammonium fluoride (0.5g) in ammoniac medium of such way that the pH of the mixture is higher than 10. The reagents quantities are taken in stoichiometric proportions according to the following reaction:



The mixture is then heated under agitation at 80°C during two hours of precipitation. After maturation, filtration and drying of the precipitate, the obtained powder was heated in a continuous pipe still with at 900°C during three hours before be characterized by various physicochemical. The obtained synthetic apatite are $\text{Ca}_{10}(\text{PO}_4)_6\text{F}_2$, $\text{Ca}_6\text{Sr}_4(\text{PO}_4)_6\text{F}_2$, $\text{Ca}_4\text{Sr}_6(\text{PO}_4)_6\text{F}_2$ and $\text{Sr}_{10}(\text{PO}_4)_6\text{F}_2$ corresponding for $x = 0, 4, 6$ and 10 successively.

X ray diffraction and Rietveld refinements with FullProf code are used in order to determine a and c cell parameters, atomic positions, site occupancies and thermal parameters for various substitutions.

The results are given with the values of R-factor and the Bragg R-factor.

The analysis of the results gives evidence that the Ca^{2+} substitution by Sr^{2+} modifies the cell parameters (a and c) which increase with the introduction of Strontium ions, but the group of space is preserved for these compounds.

To help gain understanding the retention properties of apatites ($\text{Ca}_{10-x}\text{Sr}_x(\text{PO}_4)_6\text{F}_2$) we have carried out an electronic structure study. The calculation were performed using CRYSTAL code. Other synthesized apatite with heavy metal are in progress.

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MS17 P17

Preparation and x-ray characterization of the mixed oxides ($\text{Gd}_{1-x}\text{RE}_x)_2\text{O}_3$; (RE=Ho, Yb and Y) as powder and thin films buffer layers for YBCO coated conductors Z.K. heiba^a, L. Arda^b, ^aPhysics Department, Faculty of science, Ain Shams University, Cairo, Egypt. ^bBahcesehir University, Faculty of Arts and Science, Besiktas Campus, 34349 Istanbul, Turkey . E-mail: zein_kh@yahoo.com

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Buffer layers from mixed rare-earth oxides ($\text{Gd}_{1-x}\text{RE}_x)_2\text{O}_3$; (RE=Ho, Yb and Y) with 100% lattice match with $\text{YBa}_2\text{Cu}_3\text{O}_{7-\delta}$ (YBCO) were prepared applying a simple sol-gel process and dip-coating method. X-ray diffraction structural analysis of the sol-gel derived powders were performed using Rietveld refinement method and the value of mixing parameter x which eliminate the lattice mismatch with YBCO was determined. The cationic distribution over the two non-equivalent sites 8b and 24d, figure 1, of the space group $Ia-3$ is investigated. The analysis showed anisotropic variation of crystallite size and microstrain along different crystallographic directions. Microstructural investigations were carried out for ($\text{Gd}_{1-x}\text{RE}_x)_2\text{O}_3$ films, with appropriate value of x, epitaxially grown on cube textured Ni (100) substrates by sol-gel dip coating process. X-ray diffraction of the films showed strong out-of-plane orientation on Ni tape. The ($\text{Gd}_{1-x}\text{RE}_x)_2\text{O}_3$ (222) pole figure indicated a single cube-on-cube textured structure. The full-width-at-half-maximum (FWHM) values of omega and Phi scans of the films revealed good out-of-plane and in-plane alignments. ESEM and AFM micrographs of the film revealed pinhole-free, crack-free, smooth and dense microstructures.

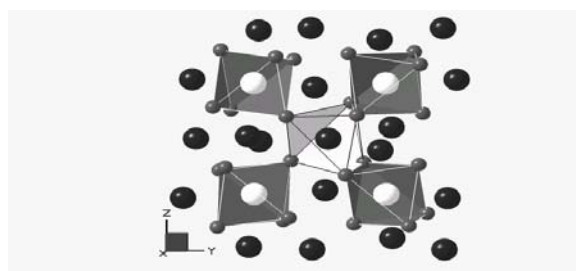


Figure 1. Oxygen octahedra in the cubic rare earth bixbyite structure $Ia-3$. For clarity, only one half of the unit cell is shown, in the X direction. Large balls (dark 24d, white 8b) represent rare earth atoms and small ones represent oxygen.