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Structural studies of YOF synthesized by hydrothermal and pyrolysis of trifluoroacetate precursor methods

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The crystal structure of yttrium oxyfluoride (YOF) samples were investigated for solar cell applications [1]. The oxyfluorides show promising host potential since they combine the main advantages of oxides with fluorides, such as low phonon energy and low probability of multiphoton quenching [2]. YOF samples were synthesized by the hydrothermal and pyrolysis of trifluoroacetate precursor methods. The x-ray diffraction patterns exhibit a crystalline phase of stoichiometric rhombohedral YOF (space group: R3¯m (166)) after annealing for the hydrothermal and the pyrolysis methods respectively [3, 4]. The as-prepared samples for the hydrothermal method first showed an amorphous yttrium fluoride (YF3) structure that decomposed by annealing in air at 700 0C into a mixture of orthorhombic YF3 with appearance of peaks of orthorhombic Y5O4F7 and at 900 0C into a YOF structure with small impurity peaks of cubic yttrium oxide. The as-prepared samples for the pyrolysis method exhibit amorphous yttrium trifluoroacetate that also decomposed at 700 0C into orthorhombic YF3 with appearance of peaks of orthorhombic Y5O4F7 and at 900 0C it decomposed into a pure YOF structure. Further investigations on the effect of annealing on the crystal structure, the crystallite sizes, the morphology and photoluminescence will be done to compare between the two synthesis techniques.

References

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