Abstract

Two methods for preparing the double perovskite compound of $LaSrMnRuO_6$ are followed. The X-ray powder diffraction combined with the standard Rietveld refinement technique are used to evaluate the rate of purity as well as to obtain the lattice parameters, the space group and the atoms positions of each sample. Single phase materials with an orthorhombic crystal structure and space group Pbnm are obtained for the sample prepared by sol-gel method. The first method is solid state reaction in which the sample is sintered at maximum temperature of 1200^{o} C. The lattice parameters and the size of the unit cell crystal for the best sample in this method are found to be a = 5.50 A^{o} , b = 5.53 A^{o} , c = 7.87 A^{o} and V = 236.23 A^{o3} . On the other hand, the second method is the chemical sol-gel technique where the compound is sintered at relatively low temperature of 800^{o} C. The lattice parameters and the unit cell volume are found to be a = 5.57 A^{o} , b = 5.64 A^{o} , c = 7.85 A^{o} and V = 236.7 A^{o3} .

The atoms positions and the lattice parameters of the successfully prepared sample are compared with that reported by Goodenough *et.al [Phy. Rev. B69 (2004) 094416]* and found to be approximately the same with slightly smaller unit cell volume.

The Fourier maps are calculated for the successfully prepared sample and the electronic charge density was obtained. The material looks ionic more than covalent which signify that this material is likely to be semiconductor or insulator rather than metal.

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Dedication

******* To my parents ******

********My husband*********

******My daughter

Bara’ah*****

******Brothers and

sisters******

**********All whom I love.

Manahil

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