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Structural Effect of La Modified $PbTiO_3$ Perovskites

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Abstract. The $Pb_{1-x}La_xTiO_3$ **(**for x=0.0, 0.10, 0.25, 0.30 and 0.50) compounds were prepared by conventional solid state route. The X-ray diffraction (XRD) pattern was recorded at room temperature and the samples were found in single phase form. The pure samples (x=0) could be indexed to *P4mm* space group in tetragonal symmetry, but the doped samples could be indexed using $Pm\bar{3}m$ space group in cubic symmetry. XRD pattern has been analyzed by employing Rietveld method with the help of FullProf Program. The bond lengths and angles have been calculated by using Powder Cell Programme. We have observed that, the Pb-Ti, Ti-O_1, Ti-O_2, Pb-O_1 and Pb-O_2 bond lengths decreased with the increase in La concentration and also Ti-O_1, and Pb-O_2 distances are statistically different from pure and doped samples due to its structural changes and symmetry dependence. The crystallite size was obtained by using Scherrer method, Hall-Williamson method, and Rietveld refinement method. It is observed that crystallite size decreases with increase La concentration for both the annealed samples.

Keywords: Ceramic; Rietveld; FullProf; XRD; Crystallite size.

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