

Supporting Information to Raman Spectra and Defect Chemical Characteristics of Sr(Ti,Fe)O_{3-y} Solid Solution of Bulk Pellets vs. Thin Films

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Group theoretical analysis of the different phases of SrFeO_{3-y}

Table 1: Mechanical representations of the different SrFeO_{3-y} phases

Cubic phase	SrFeO ₃	<i>Pm3m</i>
	Raman	none
Tetragonal phase	Sr ₈ Fe ₈ O ₂₃	<i>I4/mmm</i>
	Raman	$7A_{1g} + 7B_{1g} + 6B_{2g} + 11E_g$
Orthorhombic phase	Sr ₄ Fe ₄ O ₁₁	<i>Cmmm</i>
	Raman	$6A_g + 6B_{1g} + 5B_{2g} + 4B_{3g}$
Brownmillerite phase	Sr ₂ Fe ₂ O ₅	<i>Imma</i>
	Raman	$13A_1 + 12A_2 + 12B_1 + 14B_2$

XRD patterns of the thin films and bulk pellets

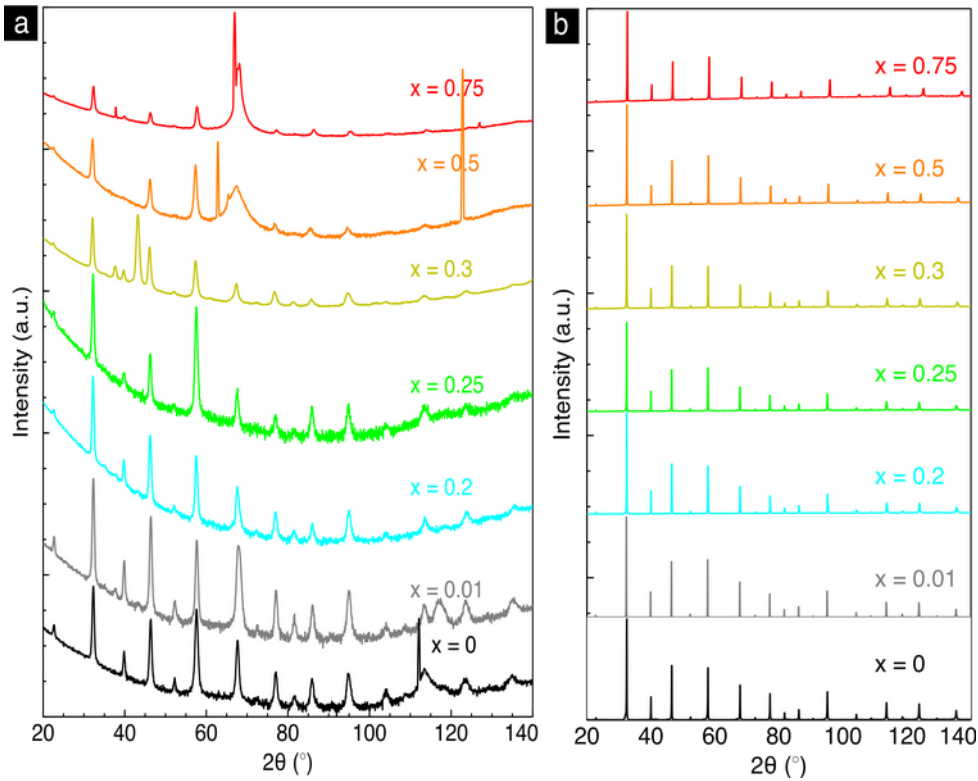


Figure S1: XRD patterns of the $\text{SrTi}_{1-x}\text{Fe}_x\text{O}_{3-y}$ thin films grown on sapphire (a) and the bulk pellets (b) for different x .

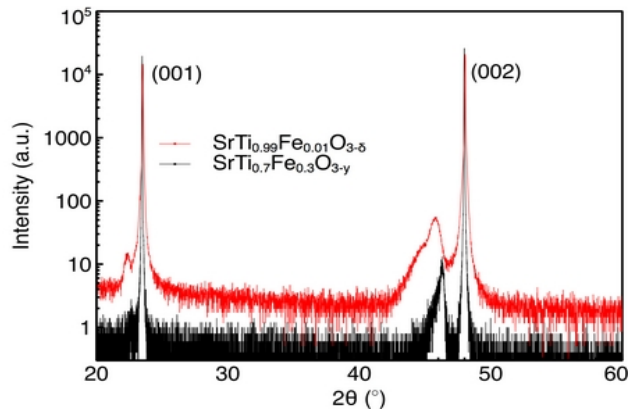


Figure S2: XRD pattern of the oriented thin films grown on LaAlO_3 .