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Growth of YVO_3 thin films by pulsed laser deposition

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The perovskite structure adapts its unit cell symmetry, volume and internal distortions to the ionic radii of its different elements. For the $ReVO_3$ family, the ionic radius of the rare-earth (Re) determines the degree of orthorhombicity (orthorhombic strain $s = 2(a-b)/(a+b)$) and the angle of rotation of the oxygen octahedra: Re=La (ionic radius $r(La^{3+}) = 1.16\,Å$) leads to an almost in-plane square lattice ($s = -0.0011$), while for Re=Y ($r(Y^{3+}) = 1.019\,Å$) the in-plane lattice is strongly orthorhombic ($s = 0.0571$). Such asymmetry poses a challenge for the epitaxial growth on square-lattice substrates, potentially resulting in a large shear strain for the layer. We present results on the growth of YVO_3 thin films by pulsed laser deposition on $(110)_o$ $NdGaO_3$ substrates. The structural characterization by X-ray diffraction and atomic force microscopy reveals the substrate temperature - oxygen pressure growth window to obtain layers with high crystalline perfection. Analysis of the diffraction data shows that the rotations of the oxygen octahedra of the layer are coupled to the ones of the substrate.