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Chemical strain engineering of magnetism in PrVO3 thin films WILFRID PRELLIER, CRISMAT/CNRS/ENSICAEN, OLIVIER COPIE, UJF/CNRS/Universite de Loraine/Nancy/France, JULIEN VARIGNON, UMP/CNRS/THALES/Universite Orsay/France, HELENE ROTELLA, GWLADYS STECIUK, PHILIPPE BOULLAY, ALAIN PAUTRAT, ADRIAN DAVID, BERNARD MERCEY, CRISMAT/CNRS/ENSICAEN, PHILIPPE GHOSEZ, Q-Mat/CESAM/Universite Liege/Belgique — Transition metal oxides having a perovskite structure present a wide range of functional properties ranging from insulator-to-metal, ferroelectricity, colossal magnetoresistance, high-temperature superconductivity and multiferroicity. Such systems are generally characterized by strong electronic correlations, complex phase diagrams and competing ground states. In addition, small perturbation induced by external stimuli (electric or magnetic field, temperature, strain, pressure..) may change structure, and ultimately modify the physical properties. Here, we synthetize an orthorhombic perovskite praseodymium vanadate ($PrVO_3$), which is grown on strontium titanate substrate. We show that the control of the content of oxygen vacancies, the so-called chemical strain, can indeed result in unexpected properties. We further demonstrate that the Nel temperature can be tuned using the same substrate in agreement with first-principles calculations, and demonstrate that monitoring the concentration of oxygen vacancies through the oxygen partial pressure or the growth temperature can produce a substantial macroscopic tensile strain of a few percents.

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