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Comparative study of $LaNiO_3/LaAlO_3$ heterostructures grown by oxide MBE and PLD techniques[1] FRIEDERIKE WROBEL, GENNADY LOGVENOV, GEORG CHRISTIANI, EVA BENCKISER, Max Planck Institute for Solid State Research, Heisenbergstr. 1, 70569 Stuttgart, Germany, ALISON F. MARK, WILFRIED SIGLE, PETER A. VAN AKEN, Max Planck Institute for Intelligent Systems, Heisenbergstr. 3, 70569 Stuttgart, Germany, BERNHARD KEIMER, Max Planck Institute for Solid State Research, Heisenbergstr. 1, 70569 Stuttgart, Germany — The physical properties of functional oxides can be altered by, e.g., dimensionality, strain, interfacial interaction and doping. Ozone assisted molecular beam epitaxy (oxide MBE) is a technique that gives wide access to all tuning parameters while having a low deposition energy. We succeeded in growing high-quality heterostructures based on $LaNiO_3$ with oxide MBE and pulsed laser deposition (PLD) and compared crystallinity, resistivity, x-ray absorption (XAS), orbital polarization and high-resolution transmission electron microscopy (HRTEM) images. Despite the difference in growth conditions, the samples show essentially the same physical properties: By reducing the layer thickness, $LaNiO_3$ turns from a paramagnetic metal into an antiferromagnetic insulator. XAS confirms the nickel +III oxidation state and that the orbital polarization is mainly controlled through substrate strain.

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