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Ultrathin NiO(100) films on Ag(100): Pitfalls in understanding growth using intensity-voltage low-energy electron diffraction — •Jan Lachnitt[1], Shuvankar Das[2], Krishnakumar S. R. Menon[2], and Jan Ingo Flege[1] — [1]Applied Physics and Semiconductor Spectroscopy, Brandenburg University of Technology Cottbus-Senftenberg, Germany — [2]Surface Physics & Material Science Division, Saha Institute of Nuclear Physics, Kolkata, India

Ultrathin NiO films have prospective applications in heterogeneous catalysis, microelectronics, and spintronics and are thus an object of active research. In model systems, the Ag(100) surface is frequently used as support for these films, as its cubic lattice parameter is only 2.2% smaller than that of NiO, enabling pseudomorphic growth for very small thicknesses. Interestingly, the early-stage growth of NiO films on Ag(100) turns out to be complex compared to other simple oxide systems, such as MgO/Ag(100). We have grown pseudomorphic NiO(100) films of well-defined average thickness in steps of 0.5 monolayer (ML), up to 3 MLs, and studied them with intensity-voltage low-energy electron diffraction (IV-LEED). We have also employed density-functional theory (DFT) calculations to gain additional insights. Our IV-LEED results indicate a deviation from layer-by-layer growth, expected to take place from 2 MLs onwards [1], and the detailed analysis of the oxide-metal system has turned out to be tricky. We discuss the pitfalls and limitations of common IV-LEED procedures and compare the results with our DFT calculations and existing literature.

[1] J. Wollschläger et al., Thin Solid Films 400 (2001) 1.

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