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Epitaxial growth of Ruddlesden-Popper $La_{n+1}Ni_nO_{3n+1}$ series using reactive molecular-beam epitaxy JUNE HYUK LEE, I-CHENG TUNG, Advanced Photon Source, Argonne National Laboratory, JARRETT MOYER, Department of Physics, University of Illinois-Urbana Champaign, GUANGFU LUO, Department of Materials Science and Engineering, University of Wisconsin-Madison, SEO HYOUNG CHANG, Materials Science Division, Argonne National Laboratory, DANE MORGAN, Department of Materials Science and Engineering, University of Wisconsin-Madison, HAWOONG HONG, Advanced Photon Source, Argonne National Laboratory, PETER SCHIFFER, Department of Physics, University of Illinois-Urbana Champaign, DILLON FONG, Materials Science Division, Argonne National Laboratory, JOHN FREELAND, Advanced Photon Source, Argonne National Laboratory — We report the growth of single crystalline $La_{n+1}Ni_nO_{3n+1}$ epitaxial thin films using reactive molecular-beam epitaxy. Ruddlesden-Popper $La_{n+1}Ni_nO_{3n+1}$ compounds, consisting of LaO^+ and $NiO_2{}^-$ layers, have been considered a potential candidate for solid-oxide fuel cell cathodes and thermoelectrics. However, the growth of higher order $La_{n+1}Ni_nO_{3n+1}$ single crystals has not been possible so far. We utilize synchrotron x-ray diffraction at the Advanced Photon Source during layer?by?layer deposition together with density functional theory calculations to understand how LaO^+ and $NiO_2{}^-$ oxide layers re-arrange dynamically during growth. Using this layer re-arrangement, epitaxial La_2NiO_4, $La_3Ni_2O_7$, and $La_4Ni_3O_{10}$ films on (001)-oriented $SrTiO_3$ have been synthesized with the proper nickel valance state and structure. Here we will discuss the connection between structure and electrical transport properties. Work at the APS, Argonne is supported by the U.S. Department of Energy, Office of Science, and Office of Basic Energy Sciences, under Contract No. DE-AC02-06CH11357.

June Hyuk Lee
Korea Atom Energy Res Inst

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