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MgO/Cu_2O superlattices: growth of epitaxial two-dimensional nanostructures. P.V. WADEKAR, M.J. YANG, W.C. HSIEH, Q.Y. CHEN, C.W. LIN, J.W. CHOU, C.F. CHANG, S.T. YOU, L.W. TU, I.K. LO, Department of Physics, National Sun Yat-sen University, C.H. LIAO, Department of Physics, Military Academy, H.W. SEO, Department of Physics, Jeju National University, H.C. HUANG, N.J. HO, Department of Materials Science and Optoelectronics, National Sun Yat-sen University, S.W. YEH, Department of Mold and Die Engineering, National Kaohsiung University of Applied Science and Technology, H.H. LIAO, Enli Technology, Kaohsiung Science Park, W.K. CHU, Department of Physics, University of Houston — Superlattices (SLS) created by alternating dissimilar materials produced novel materials of multi-functionalities. The majority of work reported in literature on epitaxial SLS has been on alternating layers of the same space group (SG) and crystal structures (CS), SLS with the same CS but different SG have not been studied as much. We have grown SLS with two well-known oxide materials cuprite (Cu_2O, CS = cubic and SG = Pn m) and magnesium oxide (MgO, CS = cubic, SG = Fm m). The effects of an MgO buffer layer grown near 650C at the film-substrate interface was found to be essential to reasonable long-range atomic orders. GIXRD, XRR, electron diffraction and TEM were used to investigate the interface abruptness, smoothness and the general crystallinity of the individual layers. Interdiffusion between the MgO and Cu_2O at interfacial regions puts a limit of 250C as growth temperature of superlattice of reasonably sharp interfaces.

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