

Abstract Submitted
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Metal-insulator transition with ferrimagnetic order in epitaxial thin films of spinel NiCo_2O_4 PUNAM SILWAL, LUDI MIAO, ILAN STERN, XI-AOLAN ZHOU, JIN HU, LEONARD SPINU, DAE HO KIM, DIYAR TALBAYEV, Tulane University — Spinel NiCo_2O_4 is attractive for various technological applications but is less studied partly because of the unavailability of NiCo_2O_4 single crystal or epitaxial thin film. We have grown high-quality crystalline epitaxial NiCo_2O_4 thin films on MgAl_2O_4 (001) substrates. The systematic investigation of the films grown at various temperatures reveals a strong correlation between the structural, magnetic, and electrical transport properties. The low-temperature grown films show metallic behavior with strong ferrimagnetic ordering while the high temperature grown films are insulating with suppressed magnetic order. In addition, these films show excellent transport and magnetic properties down to 2 unit-cell thickness. Our study of temperature- and growth-condition dependent optical conductivity provides further insight in the carrier transport of these films. We observed coherent band-like transport in both low- and high temperature grown films, whereas only thermally activated hopping conductivity was reported in previous studies. The confirmation of coherent band like transport provides a basis for further improving NiCo_2O_4 for the application as transparent conducting oxide.

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