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Growth, structural, and transport properties of epitaxial Na_xCoO_2 thin films ZHIGANG MA, A. VENIMADHAV, D.A. TENNE, QI LI, A. SOUKIASSIAN, X.X. XI, D.G. SCHLOM, R. ARROYAVE, Z.K. LIU, MINHYEA LEE, Pennsylvania State University, N.P. ONG, Princeton University, H.P. SUN, XIAOQING PAN, University of Michigan — Layered cobaltate Na_xCoO_2 has attracted much attention recently due to its superconductivity and exceptionally high thermoelectric power. Here we report structural, electrical, and thermopower properties of epitaxial and topotaxial Na_xCoO_2 thin films on (0001) sapphire substrate. Topotaxial Na_xCoO_2 films were prepared by converting an epitaxial Co_3O_4 film to Na_xCoO_2 by annealing in Na vapor and epitaxial Na_xCoO_2 films were obtained by pulsed laser deposition. Structural analysis showed the films are *c*-axis oriented. For topotaxial films, annealing in different Na vapor pressures resulted in films with different Na concentrations, which showed distinct transport properties. For directly deposited epitaxial films by pulsed laser deposition, deposition parameters are found to control the Na concentration and hence the film properties. The largest thermoelectric power of the samples made by different methods is found to be similar in the range of 70-100 $\mu\text{V}/\text{K}$ at room temperature.

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