Growth of $La_{0.8}Sr_{0.2}CrO_3$ Thin Films from a Fluoride Sputtering Process

Eric L. Brosha, Rangachary Mukundan,
David R. Brown,
and Fernando H. Garzon

Los Alamos National Laboratory
Electrochemical Materials and Devices Group
Los Alamos, New Mexico 87545

ABSTRACT

Dense, thin films of $La_{0.8}Sr_{0.2}CrO_3$ were prepared on fully stabilized yttria-stabilized zirconia, sapphire, and polycrystalline substrates using 90° off axis magnetron sputtering from a stoichiometric $LaF_3/SrF_2/Cr$ composite target in an Ar atmosphere. Dense, intimately mixed films of $LaF_3/SrF_2/Cr$ were grown at both ambient sputter temperature and at 400°C with the films deposited at higher temperature exhibiting better adhesion to the substrate. Sputtering rates were typically in the range of 1500 to 2000Å/hr. Subsequent anneal at 800°C in a H_2O/Ar atmosphere converted the films to single-phase $La_{0.8}Sr_{0.2}CrO_3$. The room-temperature deposition of $LaF_3/SrF_2/Cr$ composite, precursor film permitted the patterning of electrodes for high-temperature electrochemical HC/CO gas sensors that operate using a mixed potential response mechanism. Thin films grown on polycrystalline Al_2O_3 were used to obtain four-point electronic conductivity measurements.