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Thermoelectric properties of $Ca_3Co_4O_9$ thin film[1] ROBERT KLIE, QIAO QIAO, AHMET GULEC, TADAS PAULAUSKAS, University of Illinois - Chicago, STANISLAW KOLESNIK, BOGDAN DABROWSKI, Northern Illinois University, CIHAT BOYRAZ, MEHMET OZDEMIR, DIPANJAN MAZUMDAR, ARUN GUPTA, University of Alabama — Thermoelectric oxides have attracted increasing attention due to their high thermal power and temperature stability. In particular, $Ca_3Co_4O_9$(CCO), a misfit layered structure consisting of single layer hole-doped CoO_2 sandwiched between insulating Ca_2CoO_3 rocksalt layers, exhibits a high Seebeck coefficient at 1000 K. It was suggested that the Seebeck-coefficient can be further increased by growing doped thin films with controlled defects structures. This study combines pulsed layer deposition thin film synthesis of pristine CCO on several oxide substrates, as well as CCO thin films doped with Ti, Bi or La, with aberration-corrected scanning transmission electron microscopy and electron energy loss spectroscopy (EELS) to examine the effects of interfacial strain and doping on the atomic and electronic structures of CCO. The thermoelectric properties will be measured and correlated to the local changes in the atomic and electronic structures. We will further evaluate the role of CoO_2 stacking faults, as well as film thickness on the thermoelectric properties of CCO.

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