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In-situ XRD Investigations of the Solid-state Synthesis of Doped Thermoelectric Cobalt Oxides HAIYAN CHEN, JIANMING BAI, TREVOR TYSON — Thermoelectric materials are important in converting waste heat into electricity or electrical power directly into cooling or heating. Calcium cobalt oxide has been shown to possess large figure of merit and is considered an excellent candidate for high temperature thermoelectric applications. Doping with other metal oxides is one way to improve thermoelectric properties of this family of materials. To understand the synthesis of these materials, we have carried out time resolved in-situ XRD study of the solid state reactions involved in the production of calcium cobalt oxide and doped calcium cobalt oxide from metal carbonate and metal oxides. In this presentation, observed phase transitions, intermediates, and phase evolutions will be reported and discussed. These results will be helpful in the understanding of reaction mechanisms and can provide insights into the doping mechanism involved in the improvement of the thermoelectric characteristics of calcium cobalt oxides. This work is supported by DOE Grant DE-FG02-07ER46402 and NSF Instrumentation grant DMR MRI-0722730.

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