

Determination of crystal changes on sodium cobaltite (NaCo_2O_4) by Rietveld analysis as a suitability function in thermoelectric materials

Abstract

Sodium Cobaltite, NaCo_2O_4 has been studied extensively as a new thermoelectric material. The cobalt oxide position in each sodium unit cell may determine the power produced by this type of thermoelectric materials. In this study, several set of samples were prepared by adding a fixed amount of cobalt oxide, Co_3O_4 into various quantity of sodium carbonate, $[(1+x)\text{Na}_2\text{CO}_3]$ (where $x=0.5, 1.0, 1.5, 2.0, 2.5$ and 3.0) which then sintered at 1000°C for 6 hours. The XRD results show the structure posed the $P63/mmc$ hexagonal structure. Rietveld analysis had been done to determine the crystal parameter. The parameters show that the crystal structure was changed with an addition of sodium carbonate, NaCo_2O_4 until a limit where the further addition of NaCo_2O_4 may cause destruction of the structure.