

Discovery of new thermoelectric materials for power saving society: NaCo_2O_4

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Energy saving in transport, power generation, and residential applications by using waste heat with thermoelectrics is becoming important for the era of high oil prices and global warming as one of renewable energy source. Thermoelectrics offers a solution founded on the conversion of waste heat back into useable electricity by the Seebeck effect, but its possibility of application is still low due to low conversion efficiency, and the lack of the establishment of manufacturing process. This system has been recently studied with developing of nanotechnologies to enhance the efficiency, and we fabricated NaCo_2O_4 thin film by radiofrequency (RF) magnetron sputtering on glass substrates and Si wafers. The thin film exhibited the Seebeck coefficient ($\sim 94.40 \mu\text{VK}^{-1}$) and power factor ($\sim 1.43 \times 10^{-5} \text{Wm}^{-1}\text{K}^{-2}$) at room temperature after annealing at 600°C for 2 min.