

Sintesis $\text{Ca}_3\text{Co}_2\text{O}_6$ dan CaMnO_3 dari bahan baku CaCO_3 CoCO_3 dan MnCO_3 melalui proses reaksi padatan = Synthesis of $\text{Ca}_3\text{Co}_2\text{O}_6$ dan CaMnO_3 using CaCO_3 CoCO_3 and MnCO_3 raw material by solid state reaction process

Sigit Dwi Yudanto, author

Deskripsi Lengkap: <https://lib.ui.ac.id/detail?id=20404335&lokasi=lokal>

Abstrak

[ABSTRAK

Pemanfaatan panas yang tidak terpakai adalah salah satu bentuk efisiensi energi.

Panas yang tidak terpakai dari industri dan transportasi dapat dikonversikan menjadi energi listrik dengan menggunakan material termoelektrik. Keramik $\text{Ca}_3\text{Co}_2\text{O}_6$ dan CaMnO_3 adalah salah satu contoh material. Penelitian yang dilakukan adalah percobaan sintesis keramik $\text{Ca}_3\text{Co}_2\text{O}_6$ dan CaMnO_3 menggunakan metode proses reaksi padatan.

Sintesis material menggunakan bahan baku berbasis karbonat, yaitu CaCO_3 , CoCO_3 dan MnCO_3 . Sintesis dilakukan dengan mengacu pada diagram fasa sistem Ca-Co-O dan Ca-Mn-O. Berdasarkan analisis termal, untuk mendapatkan fasa CaO , Co_3O_4 dan Mn_2O_3 maka bahan baku yang berbasis karbonat harus dikalsinasi pada suhu 800°C . Suhu pembentukan $\text{Ca}_3\text{Co}_2\text{O}_6$ berdasarkan diagram fasa sistem Ca-Co-O dan Ca-Mn-O adalah pada rentang suhu $824-1027^\circ\text{C}$ dan CaMnO_3 pada rentang suhu $1100-1600^\circ\text{C}$ dengan lingkungan atmosfer udara bebas.

Hasil sintesis diperoleh fasa $\text{Ca}_3\text{Co}_2\text{O}_6$ terbentuk paling baik pada suhu 1000°C , tetapi masih terdapat fasa lain yaitu CoO dan Co_3O_4 . Fraksi berat masing-masing fasa adalah $\text{Ca}_3\text{Co}_2\text{O}_6 : \text{CoO} : \text{Co}_3\text{O}_4 = 71,1 : 21,6 : 7,3$. Sedangkan pada sintesis CaMnO_3 , fasa CaMnO_3 sudah terbentuk satu fasa pada suhu 1100°C .

<hr>

ABSTRACT

Heat is one kind of energy source that can increase energy efficiency. Heat from industrial and transportation can be converted into electrical energy through a thermoelectric material. $\text{Ca}_3\text{Co}_2\text{O}_6$ and CaMnO_3 ceramics are thermoelectric materials. The main idea of this research is synthesis of $\text{Ca}_3\text{Co}_2\text{O}_6$ and CaMnO_3 ceramics using solid state reaction method.

Synthesis of thermoelectric materials using carbonate-based raw materials. The raw materials are CaCO_3 , CoCO_3 and MnCO_3 . Synthesis of material is done with reference to the phase diagram system of Ca-Co-O and Ca-Mn-O. Based on thermal analysis, the carbonate-based raw materials must be calcined at temperature 800°C to get CaO , Co_3O_4 and Mn_2O_3 phases. The temperature formation of $\text{Ca}_3\text{Co}_2\text{O}_6$ and CaMnO_3 are about $824-1027^\circ\text{C}$ based on phase diagram system of Ca-Co-O and $1100-1600^\circ\text{C}$ based on phase diagram system of

Ca-Mn-O in air.

Ca₃Co₂O₆ phase is formed at temperatures of 1000°C, but there were some other phase, i.e., CoO and Co₃O₄. Weight fraction of each phase is Ca₃Co₂O₆ : CoO : Co₃O₄ = 71,1 : 21,6 : 7,3. While CaMnO₃ one phase is already formed at 1100°C.; Heat is one kind of energy source that can increase energy efficiency. Heat from industrial and transportation can be converted into electrical energy through a thermoelectric material. Ca₃Co₂O₆ and CaMnO₃ ceramics are thermoelectric materials. The main idea of this research is synthesis of Ca₃Co₂O₆ and CaMnO₃ ceramics using solid state reaction method.

Synthesis of thermoelectric materials using carbonate-based raw materials. The raw materials are CaCO₃, CoCO₃ and MnCO₃. Synthesis of material is done with reference to the phase diagram system of Ca-Co-O and Ca-Mn-O. Based on thermal analysis, the carbonate-based raw materials must be calcined at temperature 800°C to get CaO, Co₃O₄ and Mn₂O₃ phases. The temperature formation of Ca₃Co₂O₆ and CaMnO₃ are about 824-1027°C based on phase diagram system of Ca-Co-O and 1100-1600°C based on phase diagram system of Ca-Mn-O in air.

Ca₃Co₂O₆ phase is formed at temperatures of 1000°C, but there were some other phase, i.e., CoO and Co₃O₄. Weight fraction of each phase is Ca₃Co₂O₆ : CoO : Co₃O₄ = 71,1 : 21,6 : 7,3. While CaMnO₃ one phase is already formed at 1100°C., Heat is one kind of energy source that can increase energy efficiency. Heat from industrial and transportation can be converted into electrical energy through a thermoelectric material. Ca₃Co₂O₆ and CaMnO₃ ceramics are thermoelectric materials. The main idea of this research is synthesis of Ca₃Co₂O₆ and CaMnO₃ ceramics using solid state reaction method.

Synthesis of thermoelectric materials using carbonate-based raw materials. The raw materials are CaCO₃, CoCO₃ and MnCO₃. Synthesis of material is done with reference to the phase diagram system of Ca-Co-O and Ca-Mn-O. Based on thermal analysis, the carbonate-based raw materials must be calcined at temperature 800°C to get CaO, Co₃O₄ and Mn₂O₃ phases. The temperature formation of Ca₃Co₂O₆ and CaMnO₃ are about 824-1027°C based on phase diagram system of Ca-Co-O and 1100-1600°C based on phase diagram system of Ca-Mn-O in air.

Ca₃Co₂O₆ phase is formed at temperatures of 1000°C, but there were some other phase, i.e., CoO and Co₃O₄. Weight fraction of each phase is Ca₃Co₂O₆ : CoO : Co₃O₄ = 71,1 : 21,6 : 7,3. While CaMnO₃ one phase is already formed at 1100°C.]