Komitet za termodinamiku i fazne dijagrame Srbije

u saradnji sa:

Fakultetom tehničkih nauka u Kosovskoj Mitrovici,
Tehničkim fakultetom u Boru i
Associated Phase Diagram and Thermodynamics Committee
(Poland, Czech Republic, Hungary, Bulgaria, Slovenia, Serbia, Montenegro, Romania, Croatia, Bosnia and Herzegovina)

Deseti simpozijum o TERMODINAMICI I FAZNIM DIJAGRAMIMA

sa međunarodnim učešćem

Zbornik izvoda radova

Kosovska Mitrovica,
25 - 26. jun 2021.

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Godina izdavanja:
2021

Tiraž: 100 primeraka

ISBN: 978-86-81656-22-8

Štampa: SaTCIP d.o.o Vrnjačka Banja

Na osnovu člana 55. stav. 1. tačke 8. i 38. Statuta Fakulteta tehničkih nauka u Kosovskoj Mitrovici, Nastavno-naučno veće na svojoj sednici održanoj dana 17.02.2021. godine, donelo je ODLUKU br. 118/3-1 o organizovanju naučnog skupa u 2021. godini, pod naslovom: „Deseti simpozijum o termodinamici i faznim dijagramima“.

Simpozijum je finansijski podržan od strane
Ministrastva obrazovanja, nauke i
tehnološkog razvoja Republike Srbije

Deseti simpozijum o termodinamici i faznim dijagramima

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dipl. inž. M. Mitrović

Sadržaj

Plenarno predavanje:

Izvodi radova:

Application of thermal analysis in characterization of limestone for obtaining of the metallic calcium

Miroslav Sokić [1], Branislav Marković [1], Vladislav Matković [1] Vaso Manojlović[2]

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Abstract

This paper present results of experimental investigations of metallic calcium production from Serbian carbonate raw materials by aluminothermic process and the basic operating parameters of the particular technological phases. The limestone with high content of Mg, Na and K was used in the study. X-ray analysis reveals that samples contain mainly calcite with small amount of dolomite. The DTA/TG analysis of the limestone samples from site "Čačak" (samples C I and C II) and chemical composition of limestone samples are presented in the graphical abstract. At DTA curves of both C I and C II samples sharp endothermic peaks are noticed, related to the dissociation process followed by the endothermic heat effect. Since the DTA curves show only one clearly defined peak, it can be concluded that the calcium carbonate is solely present in the raw materials in the form of calcite, while aragonite is not present. At first, the effects of temperature, time and granulometry on the calcium carbonate calcination were examined. The dissociation process was completed in 10–15 min at 1200 °C, and the dissociation rate increased with decreasing particle size down to 5 mm. Afterwards, the aluminothermic reduction process of calcium oxide was investigated. At a temperature of 1200 °C and vacuum of at least 3 kPa, the reduction process was completed within 2 h. The chemical composition of calcium oxide and metallic calcium showed increased content of magnesium oxide and alkaline oxides (especially sodium).

Acknowledgement

The authors are grateful to the Ministry of Education, Science and Technological Development of the Republic of Serbia (Contract number: 451-03-9/2021-14/200023) for the financial support of this investigation.

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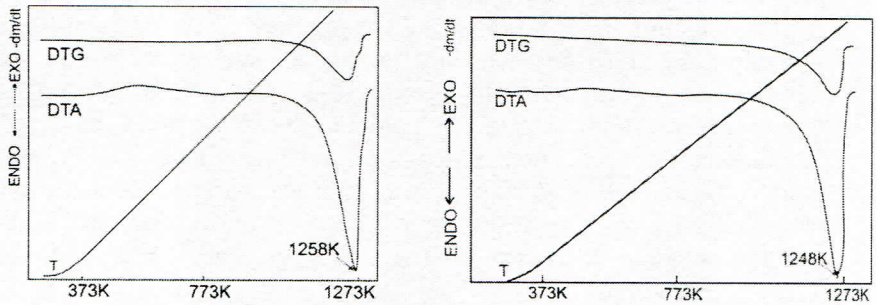
Graphical abstract:

The chemical composition of used limestone samples

Component	Content, %	
	CI	CII
CaO	53.65	53.72
MgO	1.18	1.52
Al_2O_3	0.19	0.03
Fe_2O_3	0.15	0.18
SiO_2	1,21	0,39
Na_2O	0.09	0.16
K_2O	0.03	0.02
Loss of annealing	43.36	43.88



DTA/TG Analysis of the: a) C I and b) C II sample

CIP - Каталогизација у публикацији - Народна библиотека Србије, Београд

669.017(048)
536.7(048)

СИМПОЗИЈУМ о термодинамици и фазним дијаграмима (10 ; 2021 ; Косовска
Митровица)
Zbornik izvoda radova / Deseti simpozijum o termodinamici i faznim dijagramima sa međunarodnim učešćem, Kosovska Mitrovica, 25-26 jun 2021. god. ; [organizator] Komitet za termodinamiku i fazne dijagrame Srbije ... [et al.] ; [urednik Duško Minić]. - 1. izd. - Kosovska Mitrovica : Fakultet tehničkih nauka, 2021 (Vrnjačka Banja : SaTCIP). - 182 str. : ilustr. ; 26 cm

Na nasl. str.: Univerzitet u Prištini. - Tiraž 100. - Bibliografija: str. 177-182.

ISBN 978-86-81656-22-8

a) Физичка металургија - Апстракти b) Термодинамика - Апстракти

COBISS.SR-ID 41309961

ISBN-978-86-81656-22-8