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La₂CuO₄ AS A PROMISING OXYGEN CARRIER FOR CLOU PROCESS

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The Ruddlesden-Popper La₂CuO₄ phase was confirmed by Rietveld method under orthorhombic structure with Cmce space group. The oxygen content was determined by thermogravimetry in air and in reducing atmosphere.

The official share of world electricity produced by heat power plants amounted 60,2 percents in 2018 [1]. Since those operations are related with significant emissions of greenhouse gas a design of new ecological friendly technologies becomes an actual issue. One of them is chemical looping with oxygen uncoupling (CLOU) approach based on the using of oxygen carriers (OCs) that uptake the oxygen from air for subsequent the fuel combustion [2]. The oxygen release from OC accompanies with the partial decomposition of the oxidized form and can be expressed as:

Then the oxygen depleted OC is transferred to air reactor for reoxidation. The overall CLOU process efficiency is highly affected by OC properties. Cu-based OCs is of a special interest due to high oxygen storages and exchange rates with the gas phase, however copper oxide particles tend to melt and agglomerate within the process which leads to decrease combustion efficiency [2-5].

The Ruddlesden-Popper phase La₂CuO_{4±δ} could be promising OC for the CLOU process due to the oxygen non-stoichiometry range (δ = -0,12...0,18) and stability at temperatures up to 1300 °C [6]. Oxide was synthesized by a conventional solid state route. Previously calcined lanthanum oxide at 950 °C for 12 hours and copper oxide CuO were weighted in required ratios and mixed in ethanol media. After thorough grinding the composition was pressed and fired at 950°C for 24 hours in the air. A formation of the single phase La₂CuO₄ was confirmed by X-ray powder diffraction (XRD) technique. Rietveld analysis of experimental XRD pattern was utilized in order to refine the structural parameters.

Oxygen content was studied by thermo gravimetric analysis in the air and 5% H₂ ÷ 95% Ar mixture. The value of oxygen loss of about 3,67 % at 950 °C was achieved.

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ВЯЗКОСТЬ РАСПЛАВА Fe₁₂Mn₂C

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VISCOSITY OF MELT Fe₁₂Mn₂C

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The temperature dependence of the kinematic viscosity of the Fe₁₂Mn₂C melt was measured. The results are discussed in the context of studying microheterogeneity and crystallization conditions of the Fe₁₂Mn₂C melt within the framework of the theory of absolute reaction rates.

Сплавы Fe-Mn-C нашли широкое практическое применение в качестве высокопрочных конструкционных материалов: сталь Гадфильда [1], TWIP и TRIP стали [2]. Изучение микрогетерогенности и условий кристаллизации расплавов Fe-Mn-C актуально для развития представлений физической химии металлургических процессов.

Вязкость металлических расплавов является наиболее структурно чувствительным свойством при идентификации их микрогетерогенности [3]. В данной работе представлены результаты экспериментального исследования кинематической вязкости расплава Fe₁₂Mn₂C.