The 25th International Baltic Conference of

Engineering Materials & Tribology

November 3-4 Riga, LATVIA

ABSTRACTS BOOK

The Organizer:

The Latvian Materials Research Society

Title of Edition: Book of Abstracts of Baltmattrib 2016, 25th International Baltic Conference of Engineering Materials&Tribology

Publisher: The Latvian Materials Research Society

Print: RTU Digital Print Center

ISBN 978-9934-19-029-2

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Illite Clay Ceramic Hollow Sphere - Obtaining and properties

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INTRODUCTION

Materials with custom porosity exhibit special characteristics that could be achieved by the conventional dense materials. Therefore lightweight and porous ceramic materials and structures find new application as part of technological processes as well as a final products: filters for the molten metals, support for catalysts, high temperature insulation etc. Development of new applications for the widely available natural resources and excavated (on construction sites) ground clay stimulated this research devoted to obtaining ceramic hollow sphere. Authors propose the application as lightweight substrate for the green roof, water retention agent and as lightweight filler for the construction materials [1].

EXPERIMENTAL METHODS

Clay ceramic hollow spheres (CCHS) were obtained using Devon clay from *Lode Ltd*, Latvia and expanded polystyrene (EPS) as sacrificial template at lab-scale drum granulator set-up. Obtained granules were fired at 950, 1000, 1050, 1100, 1150 °C. The compressive strength of single granule was determined by *Kahl* granule hardness tester, by utilizing 40 or more parallel tests for each sintering temperature. Water retention ability of CCHS was determined passing water through funnel filled with model soil and granules. The specific gravity and water absorption were determined by Archimedes method. Phase composition was determined by XRD using Rigaku Ultima+ diffractometer.

RESULTS AND DISCUSSION

The experimentally obtained CCHS (Fig.1.) have porosity rate of 21-36% and a water absorption rate of 15-33%. The highest rate of porosity and water absorption was observed for hollow spheres sintered at 1050 °C.

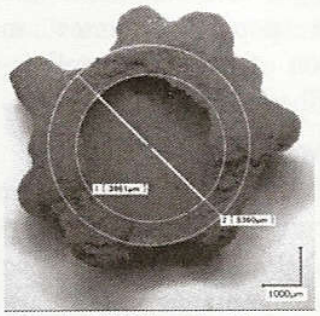

Fig.1. CCHS optical image

Increase of firing temperature led to decrease of specific surface area with the highest value at 950 °C and the lowest – at 1150 °C, the bulk density increased at 1150 °C. Mechanical strength test of ceramic hollow spheres has revealed that with the increase of firing temperature the compression strength of the spheres increases as well. Highest compression strength was observed for clay ceramic hollow spheres fired at 1150 °C. Best water retention (up to 60%) was observed samples fired at 1050 °C

CONCLUSION

Properties of the obtained clay ceramic hollow spheres make them promising material for water retention in green roofs.

REFERENCES

[1] A.R. Studart et al., *J. Am. Ceram. Soc*, 2006, 89, 1771.

ACKNOWLEDGMENTS

The present research has been supported by the National Research Program of Latvia 2014-2017 within the program No.6 project No.4. "Investigation of geological resources – new products and technologies (Earth)".