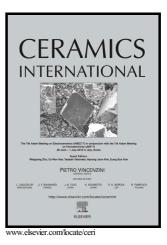
Author's Accepted Manuscript

Parametric optimization of dry sliding wear and friction of germanium doped lead calcium titanate borosilicate glass ceramic

Sangeeta Das, S.S. Gautam, C.R. Gautam, Abhishek Madheshiya, U.S. Dixit



 PII:
 S0272-8842(18)30067-1

 DOI:
 https://doi.org/10.1016/j.ceramint.2018.01.056

 Reference:
 CERI17188

To appear in: Ceramics International

Received date: 13 November 2017 Revised date: 31 December 2017 Accepted date: 8 January 2018

Cite this article as: Sangeeta Das, S.S. Gautam, C.R. Gautam, Abhishek Madheshiya and U.S. Dixit, Parametric optimization of dry sliding wear and friction of germanium doped lead calcium titanate borosilicate glass ceramic, *Ceramics International*, https://doi.org/10.1016/j.ceramint.2018.01.056

This is a PDF file of an unedited manuscript that has been accepted for publication. As a service to our customers we are providing this early version of the manuscript. The manuscript will undergo copyediting, typesetting, and review of the resulting galley proof before it is published in its final citable form. Please note that during the production process errors may be discovered which could affect the content, and all legal disclaimers that apply to the journal pertain.

ACCEPTED MANUSCRIPT

Parametric optimization of dry sliding wear and friction of germanium doped lead calcium titanate borosilicate glass ceramic

¹Sangeeta Das, ¹S. S. Gautam, ²C. R. Gautam, ²Abhishek Madheshiya and ³U. S. Dixit

¹ Department of Mechanical Engineering, North Eastern Regional Institute of Science and Technology, Nirjuli-791109, India

² Department of Physics, Lucknow University, Lucknow-226007, India

³ Department of Mechanical Engineering, Indian Institute of Technology Guwahati, Guwahati-781039, India

Abstract

In this study, specific wear rate (SWR) and coefficient of friction (COF) of the synthesized samples in $55[(Pb_xCa_{1-x})O.TiO_2]-44[2SiO_2.B_2O_3]-1Ge$ with $(0 \le x \le 0.7 \text{ mole}\%)$ system of glass ceramics was optimized using Taguchi method. The ASTM standards were used for preparing the samples for friction and wear tests on a pin-on-disc tribometer. The glass ceramic samples were used as pin materials that slid against a disc made up of EN32 steel. For assessing the tribological properties of the glass ceramics, three control factors, viz. material-compositions with varying fraction of x (x=0.0, 0.1, 0.3, 0.5 and 0.7 mole %), sliding speeds (2.61, 3.14, 3.66, 4.18 and 4.71 m/s) and loads (10, 15, 20, 25 and 30 N) were considered in an L₂₅ orthogonal array design. The optimum input parameters for the minimum SWR and COF were selected based on signal to noise ratios and main effect plots. Analysis of variance (ANOVA) revealed that the sliding speed and lead oxide content of the material are the most contributing factors on SWR and COF, respectively. The optimization for minimizing the SWR and COF was carried out and confirmed. The surface morphologies of the tested glass ceramic sample were studied using scanning electron microscope (SEM) and the elemental analysis of the samples was done using energy dispersive analysis of Xrays (EDAX). The Vickers hardness at the free surface of the glass ceramic samples Download English Version:

https://daneshyari.com/en/article/7887914

Download Persian Version:

https://daneshyari.com/article/7887914

Daneshyari.com