

# Accepted Manuscript

Study on tribological behaviors of Si<sub>3</sub>N<sub>4</sub> based ceramics sliding against POM under different solutions

Jiongjie Liu, Zixi Wang, Jun Yang, Bing Yin, Qichun Sun, Yulin Liu, Shuai Wang, Zhuhui Qiao

PII: S0301-679X(17)30475-9

DOI: [10.1016/j.triboint.2017.10.015](https://doi.org/10.1016/j.triboint.2017.10.015)

Reference: JTRI 4916

To appear in: *Tribology International*

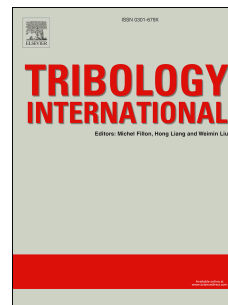
Received Date: 27 May 2017

Revised Date: 11 October 2017

Accepted Date: 14 October 2017

Please cite this article as: Liu J, Wang Z, Yang J, Yin B, Sun Q, Liu Y, Wang S, Qiao Z, Study on tribological behaviors of Si<sub>3</sub>N<sub>4</sub> based ceramics sliding against POM under different solutions, *Tribology International* (2017), doi: [10.1016/j.triboint.2017.10.015](https://doi.org/10.1016/j.triboint.2017.10.015).

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 proof before it is published in its final 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.



# Study on tribological behaviors of Si<sub>3</sub>N<sub>4</sub> based ceramics sliding against POM under different solutions

Jiongjie Liu<sup>a, b</sup>, Zixi Wang<sup>c</sup>, Jun Yang<sup>a</sup>, Bing Yin<sup>a</sup>, Qichun Sun<sup>a, b</sup>, Yulin Liu<sup>a, b</sup>, Shuai Wang<sup>a, b</sup>,  
Zhuhui Qiao<sup>a, \*</sup>

<sup>a</sup> State Key Laboratory of Solid Lubrication, Lanzhou Institute of Chemical Physics, Chinese Academy of Sciences, Lanzhou 730000, PR China.

\*Corresponding author. Tel: +86-931-4968193; fax: +86-931-8277088. E-mail address:  
zhqiao@licp.cas.cn

<sup>b</sup> University of Chinese Academy of Sciences, Beijing 100039, PR China

<sup>c</sup> State Key Laboratory of Tribology, Department of Mechanical Engineering, Tsinghua University, Beijing 100084, PR China

## Abstract

Tribological behaviors of Si<sub>3</sub>N<sub>4</sub> based ceramics against POM were investigated in distilled water and seawater as well as dry sliding condition, respectively. It was found that the effect of sliding speed on the tribological properties of system is greater than that of the load. During the drying-sliding condition, as the sliding speed raises, the amount of frictional heat is continuously output, resulting in the melting of POM. The melted polymer is transferred to the surface of ceramic to form a layer of transfer film, and the main wear is the adhesion-peeling off between the sliding surfaces. In aqueous solutions, abrasive wear is the main wear mechanism. Furthermore, due to the lubricity effect of seawater and tribochemical degradation of POM, the wear degree of Si<sub>3</sub>N<sub>4</sub> is effectively reduced.

*Key Words:* Si<sub>3</sub>N<sub>4</sub>- POM sliding pairs; Transfer films; Water lubrication; Wear mechanism

## 1. Introduction

Silicon nitride (Si<sub>3</sub>N<sub>4</sub>) ceramic, one of the most important ceramic materials in the world [1], has attracted extensive attention from both academia and industry. Owing to its high hardness, high thermal conductivity, excellent thermal shock resistance as well as corrosion resistance [2, 3], Si<sub>3</sub>N<sub>4</sub> is widely used as ball bearing, steam nozzle, electric glow plug, mechanical seal ring and other mechanical components [4, 5]. It is also one of the most important candidate materials which can be used in various environments, such as high temperature and marine environment. Some researchers found that when Si<sub>3</sub>N<sub>4</sub> sliding against itself in water, the formation of the silica gel layer induced by

Download English Version:

<https://daneshyari.com/en/article/7002380>

Download Persian Version:

<https://daneshyari.com/article/7002380>

[Daneshyari.com](https://daneshyari.com)