

Author: [ADVANCED](#)

Volume Page

Keyword: [TOP](#) > [Available Issues](#) > [Table of Contents](#) > [Abstract](#)

ONLINE ISSN : 1881-1361

PRINT ISSN : 0287-4547

Dental Materials Journal

Vol. 27 (2008) , No. 3 p.408-414

[\[Image PDF \(804K\)\]](#) [\[References\]](#)**Mechanical Properties of Dental Zirconia Ceramics Changed with Sandblasting and Heat Treatment**[Hideo SATO](#)¹⁾, [Kiyotaka YAMADA](#)²⁾, [Giuseppe PEZZOTTI](#)²⁾, [Masahiro NAWA](#)³⁾ and [Seiji BAN](#)¹⁾

1) Department of Biomaterials Science, Graduate School of Medical and Dental Sciences, Kagoshima University

2) Ceramic Physics Laboratory and Research Institute for Nanoscience, Kyoto Institute of Technology

3) Central Research Laboratory, Matsushita Electric Works, Ltd.

(Received November 2, 2007)

(Accepted November 30, 2007)

Abstract:

Two types of tetragonal zirconia polycrystals (TZP), a ceria-stabilized TZP/ Al_2O_3 nanocomposite (CZA) and a conventional yttria-stabilized TZP (Y-TZP), were sandblasted with 70- μm alumina and 125- μm SiC powders, then partially annealed at 500–1200°C for five minutes. Monoclinic ZrO_2 content was determined by X-ray diffractometry and Raman spectroscopy. Biaxial flexure test was conducted on the specimens before and after the treatments. Monoclinic ZrO_2 content and biaxial flexure strength increased after sandblasting, but decreased after heat treatment. However, in both cases, the strength of CZA was higher than that of Y-TZP. Raman spectroscopy showed that a compressive stress field was introduced on the sample surface after sandblasting. It was concluded that sandblasting induced tetragonal-to-monoclinic phase transformation and that the volume expansion associated with such a phase transformation gave rise to an increase in compressive stress on the surface of CZA. With the occurrence of such a strengthening mechanism in the microstructure, it was concluded that CZA was more susceptible to

stress-induced transformation than Y-TZP.

Key words:

[Zirconia](#), [Sandblasting](#), [Heat treatment](#)



[\[Image PDF \(804K\)\]](#) [\[References\]](#)

Download Meta of Article [\[Help\]](#)

[RIS](#)

[BibTeX](#)

To cite this article:

Hideo SATO, Kiyotaka YAMADA, Giuseppe PEZZOTTI, Masahiro NAWA and Seiji BAN. Mechanical Properties of Dental Zirconia Ceramics Changed with Sandblasting and Heat Treatment . Dent. Mater. J. 2008; 27: 408-414 .

doi:10.4012/dmj.27.408

JOI JST.JSTAGE/dmj/27.408

Copyright (c) 2009 The Japanese Society for Dental Materials and Devices



[Japan Science and Technology Information Aggregator, Electronic](#)

