

Accepted Manuscript

Title: Fracture toughness testing of biomedical ceramic-based materials using beams, plates and discs

Authors: Renan Belli, Michael Wendler, Anselm Petschelt, Tanja Lube, Ulrich Lohbauer



PII: S0955-2219(18)30498-9
DOI: <https://doi.org/10.1016/j.jeurceramsoc.2018.08.012>
Reference: JECS 12037

To appear in: *Journal of the European Ceramic Society*

Received date: 5-6-2018
Revised date: 7-8-2018
Accepted date: 10-8-2018

Please cite this article as: Belli R, Wendler M, Petschelt A, Lube T, Lohbauer U, Fracture toughness testing of biomedical ceramic-based materials using beams, plates and discs, *Journal of the European Ceramic Society* (2018), <https://doi.org/10.1016/j.jeurceramsoc.2018.08.012>

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.

Fracture toughness testing of biomedical ceramic-based materials using beams, plates and discs

Renan Belli ^a, Michael Wendler ^{a,b}, Anselm Petschelt ^a, Tanja Lube ^c, Ulrich Lohbauer ^a

^a *Friedrich-Alexander-Universität Erlangen-Nürnberg (FAU), Zahnklinik 1 – Zahnerhaltung und Parodontologie, Forschungslabor für dentale Biomaterialien, Glueckstrasse 11, 91054 Erlangen, Germany*

^b *Department of Restorative Dentistry, Faculty of Dentistry, University of Concepción, Concepción, Chile*

^c *Institut für Struktur- und Funktionskeramik, Montanuniversität Leoben, A-8700 Leoben, Austria*

Original article

* Corresponding author:

Dr. Renan Belli

Research Laboratory for Dental Biomaterials

Dental Clinic 1 – Operative Dentistry and Periodontology

Glueckstrasse 11

D-91054 Erlangen

Germany

Tel.: +49 9131 854 3741

Fax: +49 9131 853 3603

e-mail: rbelli@dent.uni-erlangen.de

Abstract

The testing of fracture toughness becomes problematic when only limited amount of material is available that hinders the production of typical beam specimens to be tested in bending. Here we explore fracture toughness testing methodologies that allow for small discs and plates having surface cracks to be tested in biaxial flexure using the Ball-on-3-balls (B3B) set-up, or sawed notches as in the Compact Tension geometry. The B3B- K_{Ic} test has shown to be versatile and account for a very small overestimation of the K_{Ic} -value in the order of 0.8 – 1.25% due to in-plane crack mispositioning, and a maximum of 4% if a worst-case scenario of additional out-of-plane mispositioning is assumed. The geometrical factor in the standard SCF method, derived by Newman and Raju,

Download English Version:

<https://daneshyari.com/en/article/10155504>

Download Persian Version:

<https://daneshyari.com/article/10155504>

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