A rolling-ball device for producing surface fatigue and its application to dental materials

Abstract

A new method of producing and evaluating surface fatigue using a rolling-ball device has been developed. The method involves constraining a rolling ruby ball between the "v" groove of a rotor and the test specimen. The ball applies a compressive stress to the surface of the test material whilst it rolls in a circular pattern across the specimen surface. The fatigue life is defined as the time taken for surface degradation to begin to occur. The method is simple and reproducible and allows fatigue data to be gathered using a relatively small number of specimens. A series of model dental composites having varying filler fractions (23.7-66.4 vol%) were used to assess the potential of the method. The pattern of material loss as well as scanning electron microscopy examination of the damaged surfaces of test specimens confirmed that a fatigue mechanism was responsible for material loss. The fatigue life varied markedly with filler volume fraction being optimized at values in the range 30-50 vol%. Lower and higher volume fractions reduced the fatigue life. Filler silanation significantly improves fatigue life. The results suggest that the rolling ball device will prove useful in comparing the properties of different materials and in the development of improved products.

Source	Journal of Materials Science
Author	McCabe, J. F. ; Abu Kasim N.H. ;Cleary, S.
ISSN	0022-2461
DOI	10.1023/a:1018528727582

Keyword

COMPOSITE RESTORATIVE MATERIALS; POSTERIOR COMPOSITE; WEAR; LIMITS. SELF-REPAIR; CULTURE-CONDITIONS; COMPOSITE RESIN; DENTAL PULP STEM CELL; FUNCTIONALLY GRADED DESIGN; MULTI LAYERED POST; FUNCTIONALLY GRADED DENTAL POST; SOFT SKILLS; CLINICAL PAIRING; DENTAL PULP STROMAL CELLS; LONG-TERM EXPANSION

Please Cite As

McCabe JF, Abu Kasim N.H. , Cleary S. A rolling-ball device for producing surface fatigue and its application to dental materials. Journal of Materials Science. [Article]. 1997 Jan;32(2):283-7.

URL

http://apps.webofknowledge.com/full_record.do?product=WOS&search_mode=MarkedList&qid=39&SID=W1CG47L3EiGEbED5oDA&page=1&doc=3&colName=WOS

http://www.deepdyve.com/lp/springer-journals/a-rolling-ball-device-for-producing-surface-fatigue-and-its-YVK8qiVHTN

http://www.deepdyve.com/lp/springer-journals/a-rolling-ball-device-for-producing-surface-fatigue-and-its-YVK8qiVHTN

http://www.springerlink.com/content/t804753l83048773/

http://www.ingentaconnect.com/content/klu/jmsc/1997/00000032/00000002/00174970

http://journals1.scholarsportal.info/details.xqy?uri=/00222461/v32i0002/283_ardfpsaiatdm.xml

http://www.chemweb.com/journals/journals?type=issue&jid=SV10853&iid=0003200002

http://www.cheric.org/research/tech/periodicals/vol_view.php?seq=137682&start=0&number=2&jourid=128&vol=32&num=2&totalcount=39

http://elibrary.ru/item.asp?id=5026097

http://www.springerlink.com/content/t804753l83048773/fulltext.pdf