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Ispitivanje hrapavosti površine glazirane Y-TZP zubne keramike nakon izlaganja korozivnom mediju

Investigation of Glazed Y-TZP Dental Ceramics Corrosion by Surface Roughness Measurement

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Sažetak

Uvod: Cirkonij-oksidna (Y–TZP) keramika zbog specifičnih svojstava često se primjenjuje u stomatologiji. Gradivni materijal može korodirati ako na njegovoj površini postoji razlika u koncentraciji elektrolita. Nekvalitetna obrada površine nadomjeska pridonosi korozivnim procesima koji i sami dodatno narušavaju površinsku morfologiju. Svrha ovog istraživanja bila je ustanoviti kemijsku stabilnost glaziranog Y–TZP-a mjerenjem parametara hrapavosti površine. **Materijali i metode:** Pripremljeno je pet uzoraka keramike Y–TZP (BruxZir, Glidewell Laboratories Š 2012) s dodatkom pigmenta A 3. Svi su bili sinterirani, polirani i glazirani – tako su simulirani završni postupci u izradi monolitičkih nadomjestaka. Nakon određivanja mase uzorka svaki je uronjen u 10 mL 4-postotne otopine octene kiseline. Svi parametri hrapavosti izmjereni su pet puta i to prije izlaganja korozivnom mediju i poslije toga postupka. **Rezultati:** Značajan porast izmjerenih parametara hrapavosti, u odnosu na početne vrijednosti, upućuje na prodiranje 4-postotne vodene otopine octene kiseline. Zabilježen je i gubitak težine uzoraka i to u iznosu od 2,45 mg/cm^2 ± 0,026. **Zaključak:** Vrlo kiseli uvjeti povećavaju površinsku hrapavost glazirane zubne keramike Y–TZP.

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Ključne riječi
keramika; svojstva površina; korozija

Uvod

U posljednjih deset godina porasla je uporaba modernih polikristaliničnih zubnih keramika (1). Istaknimo da su polikristalinične oksidne keramike najčvršće koje se rabe u stomatologiji. Među tim materijalima vrlo su čest izbor cirkonij-oksidne keramike zbog izvrsnih mehaničkih svojstava i mogućnosti transformacijskog ojačanja [pretvorba jednog kristalnog oblika, odnosno faze (manja faza) u drugi (veća faza)] (2 –5). Ovisno o temperaturi, cirkonijev oksid ima tri kristalne modifikacije (6): ispod 1170 °C ZrO_2 transformira se u monoklinsku strukturu (m-ZrO_2), između 1170 °C i 2370 °C poprima tetragonalnu kristalnu strukturu (t-ZrO_2), a iznad 2370 °C kubičnu (c-ZrO_2). Transformacija iz tetragonske u monoklinsku strukturu događa se brzo, a popratno se pojavljuje porast volumena od tri do pet posto, što pri hlađenju uzrokuje lomove manjih i/ili većih razmjera. Transformacija ZrO_2 oslabljuje mehanička svojstva gotovih proizvoda, pa je čisti ZrO_2 beskoristan u primjeni. Zbog toga se za proizvodnju gusto sinteriranih blokova koristimo blokovima u kubičnoj i/ili tetragonsko-kubičnoj modifikaciji. S namjerom da se uspori i eliminira kristalna transformacija, dodaju se određene količine aditiva (stabilizatora) – najčešće itrij ili

Introduction

The use of modern polycrystalline oxide ceramics as restorative dental material has increased over the last 10 years (1). Among these materials, the zirconia based ceramics are very widespread, because of their superior mechanical properties and transformation toughening capabilities (2-5). Pure zirconia has a monoclinic structure at room temperature, which is stable up to 1170 °C. Between this temperature and 2370 °C, tetragonal zirconia is formed, while cubic zirconia is formed at temperatures above 2370 °C. Transformation of tetragonal to monoclinic phase takes place rapidly with concomitant increase in the volume of 3-5%, which in cooling process causes cracks of smaller and / or larger scale. Transformation of ZrO_2 weakens the mechanical properties of final products and thus pure ZrO_2 becomes useless for the dental application (6). To accomplish better structure; higher strength and fracture toughness in tetragonal zirconia, the stabilizers such as Y_2O_3, HfO_2, CeO_2, CaO, MgO, ErO_2, EuO_2, Gd_2O_3, Sc_2O_3, La_2O_3, Yb_2O_3 are doped, allowing the tetragonal form to exist at room temperature after sintering (7). Also, ageing resistance and better mechanical properties significantly improve with Fe_2O_3 and CuO (8).

hafnij – koji omogućuju zadržavanje kubične (i/ili djelomice tetragonalne) strukture na sobnoj temperaturi. Potvrđeno je da oksidi povoljno djeluju na mehanička svojstva i to Y_2O_3, HfO_2, CeO_2, CaO, MgO, ErO_2, EuO_2, Gd_2O_3, Sc_2O_3, La_2O_3, i Yb_2O_3 a Fe_2O_3 i CuO (7,8). Tetragonalna cirkonijeva oksidna zubna keramika (Y–TZP), djelomice stabilizirana itrijem, postala je popularna kao zamjenski materijal (metalnim legurama) za izradu osnovne konstrukcije ili za monolitičke konstrukcije izrađene uz pomoć tehnologije računalnog oblikovanja i izrade nadomjestaka (CAD/CAM) (9,10). Danas se cirkonijev oksid stabiliziran itrijem često primjenjuje u stomatologiji, posebice ako se sanira distalna regija zubnog niza. Ima izvrsna mehanička svojstva (čvrstoća i lomna žilavost). Također može *transformirati* male pukotine unutar materijala nastale zbog cikličkog naprezanja u materijalu ili korozije u vlažnoj oralnoj sredini. Takve transformacije poznate su u literaturi pod nazivom *naprezanjem izazvana faza*. Slina (sastavni dio vlažnog oralnog medija) može varirati količinom (kserostomija koja se ponekad, ako nema kompleksniju kliničku pozadinu, liječi konzumacijom kiselih otopina ili hipersalivacija) i / ili pH vrijednostima od 5,5 do 6,4. Ostali *vanjski* pasivni čimbenici su iatrogeni, poput konzumacije kiselih, lužnatih, vrućih napitaka i sl. Cirkonijev oksid nestabilan je već na temperaturi od 65°C.

Plak, kao posljedica loše higijene, također može pridonijeti kemijskoj degradaciji gradivnih materijala. Aktivni sudionici su mišići. Stalnim radom potiču cikličko naprezanje materijala preko posrednika, antagonista (prirodni zubi ili nadomjesci). Funkcija mišića može biti fiziološka, s napomenom da se zubi u danu dotaknu oko 2 000 puta i to oko 500 puta noću dok se guta slina. Patološka funkcija očituje se pri stiskanju i škripanju zuba (bruksizam i bruksomanija) (11).

Glavni problem monolitičkih keramičkih nadomjestaka jest postupak završne obrade površine – glaziranja ili poliranja. Općenito, glaziranje je postupak koji smanjuje poroznost, smanjuje površinsku hrapavost, a poliranje je postupak koji je pod kontrolom brzine okretaja rotirajućim instrumentom (13).

Svrha ovog istraživanja bila je ispitati kemijsku stabilnost keramike Y–TZP u 4-postotnoj vodenoj otopini octene kiseline na 80 ° C i to 768 sati, mjerenjem parametara hrapavosti površine prije i poslije korozije.

Materijali i postupci

Ispitivanja su provedena na uzorcima cirkonij-oksidne zubne keramike stabilizirane itrijem (Y–TZP) tvorničkog naziva *BruxZir,* s dodatkom pigmenta A 3 koji se odnosi na primjesu boje po VITA-ključu za odabir nijanse (14). *BruxZir* se proizvodi za kliničku uporabu i patentirani je proizvod Glidewell Laboratoriesa. Uzorci su sinterirani i polirani. Glazura je standardna (glinična). Strojnim postupkom glodanja proizvođač je, koristeći se CAD/CAM tehnologijom, napravio pločice dimenzija 10 mm × 10 mm × 2 mm. Postupak sinteriranja obavljen je prema standardima za uobičajenu proizvodnju keramičkih nadomjestaka Glidewell Laboratoriesa. Uzorci su oprani destiliranom vodom u ultrazvučnoj kupelji

Chevalier stated that in some zirconia based ceramics containing the tetragonal phase, high fracture toughness is associated with ferroelastic domain switching. The addition of varying amounts of stabilizers allows the formation of partially or fully stabilized zirconia which, when combined with changes in processes, may result in ceramics with exceptional properties such as high flexural strength and fracture toughness, high hardness, excellent chemical resistance and good conductivity ions. Yttrium partially stabilized tetragonal zirconium (Y-TZP), has become popular as an alternative high-toughness dental material for solid core structure (bridge construction with or without attachment on the ends) or monolithic crown produced by computer-aided design/computer-assisted manufacture (CAD/CAM) (9, 10). Compared to other dental ceramics, Y-TZP ceramics have superior strength, fracture toughness, and damage tolerance due to a stress-induced transformation toughening mechanism, which operates in this particular class of ceramics.

Y-TZP ceramic material has been seen to possess ageing effects, which is facilitated by physical and chemical factors. Exposure to chemical agents results in creating superficial micro cracks. The changes also known as corrosion or chemical degradation depend on different values of pH in the oral media. Physical agents act under mechanical stress (muscle function can be physiological and pathological), temperature fluctuations (combining hot and cold food or beverages) or during surface treatments of fixed partial denture (FPD). This is known as low temperature ageing (LTD) (11).

The major problem with monolith all-ceramics is the finishing procedure (techniques), which can be: glazing and high polishing. Generally, glazing is a procedure that increases the overall mechanical strength of all ceramics restorations with a three-fold effect: reduces porosity, reduces the depth and/or sharpness of surface flaws, and blunts the flaw tips. Besides, the polishing process, under controlled speed, is a more commonly used surface finishing method and is thus recommended in clinical settings where a less smooth surface would not cause major functional and/or aesthetic problems (13).

The aim of this study was to investigate chemical stability of Y-TZP dental ceramics exposed to 4 % acetic acid at 80 °C for 768 h by measuring surface roughness before and after the corrosion process.

Materials and methods

Five samples of Y-TZP material (BruxZir, Glidewell Laboratories) with the addition of pigment A3 were sintered, polished and glazed over the whole surface to imitate the finishing process by producing monolithic crowns, according to the manufacturer's instructions. A3 pigment refers to the admixture of a colour that corresponds to the key of VITA classic guide (14). The glaze was feldspathic. The samples were made by the manufacturer, with dimensions of 10 × 10 × 2 mm. Sintering procedure was carried out by the usual standards of production of ceramic restorations by Glidewell Laboratories. Samples were washed in distilled water in an ultrasonic bath (UltraSonic Bath Model 1510 DTH, Electron

(Bransonic 220, Branson Cleaning Eqipment, Kanada) prema standardu ISO 3696, sušeni u sušioniku (Instrumentaria, Zagreb, Hrvatska) na sobnoj temperaturi te im je izmjerena ukupna površina u cm^2. Masa uzoraka određena je na preciznoj analitičkoj vagi s točnošću mjerenja od 10^{-5} g (Ohaus, Analytical plus, SAD). Za određivanje hrapavosti korišten je uređaj profilometar (Perthometer S&P, Njemačka). Snimljeni su profili hrapavosti prije izlaganja agresivnom mediju (768 sati) i nakon toga postupka. Iz snimljenih profila određeni su sljedeći parametri: R_a-srednja hrapavost, R_{max}-maksimalna dubina hrapavosti i R_z-prosječna maksimalna visina profila. Svaki uzorak prenesen je u polipropilensku (PP) epruvetu volumena 13 mL, te im je dodano po 10 mL otopine korozivnog medija tako da je uzorak bio posve okružen korozivnim medijem. Radi određivanja brzine korozije modificirana je standardna metoda produženjem vremenskog izlaganja uzoraka (768 sati) jer se htjelo ustanoviti prodiranje korozivnog medija u strukturu materijala. Rezultati su opisani deskriptivnom statistikom i Mann-Whitneyevim testom, izračunom prosječne vrijednosti i standardnom pogreškom mjerenja.

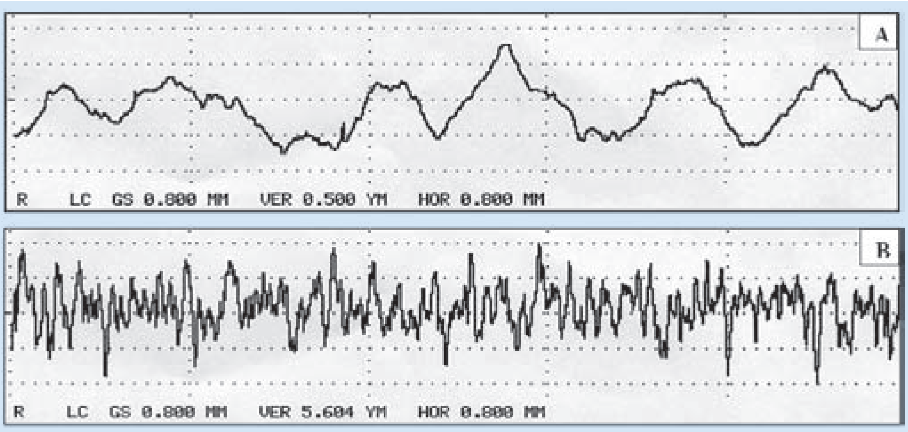
Rezultati

Za ocjenu korozijske reaktivnosti uzoraka zubne keramike Y–TZP primijenjena je metoda praćenja promjene hrapavosti površine kao posljedice djelovanja 4-postotne otopine octene kiseline. Dijagrami profila hrapavosti pokazuju značajnije veću dubinu prodiranja korozije (maksimalna dubina hrapavosti) s površine uzorka A3G u određenim područjima nakon izlaganja korozivnom mediju (slika 1.b) u usporedbi s početnim stanjem površine uzorka A3G (slika 1.a). To je vidljivo i u vrijednostima parametara hrapavosti (slike 2 – 4.) te se iz dobivenih rezultata može uočiti da se vrijednosti svih parametara hrapavosti, na mikroljestvici za uzorak A3G, povećavaju nakon 768 sati izlaganja 4-postotnoj otopini octene kiseline. Dobivene su vrijednosti sljedećih parametara: R_a, R_{max} i R_z. prije korozije i poslije nje (slike 2 –2). Dobiveni rezultati pokazuju da su nakon korozije znatno porasli svi izmjereni parametri u odnosu na početne vrijednosti. Gubitak mase nakon korozije iznosio je 2,45 mg/cm^2 ± 0,026.

Microscopy Sciences, Hatfield, USA) (ISO 3696) and dried. After determining the mass of the samples with the accuracy of $\pm 10^{-5}$ g (analytic scale, Ohous, Analytical), each sample was immersed in 10 ml of 4 wt. % CH_3COOH solution in a polypropilene bottle. The bottles were placed in a thermostatic shaker (Innova 4080 Incubator-shaker, Herisau, Switzerland) at 80 °C with 200 rpm for 768 hours. The reason for extending the time of corrosion was to determine whether deeper penetration of corrosive agents in the structure of the Y-TZP would occur. The roughness of each sample was measured in tree spots by means of Perthometer S&P 4.5 (Feinprut Perthen GmbH, GOETTINGEN, Deutschland). The roughness was measured five times before and after immersion. The research was done according to ISO 6872 protocol (International Organization for Standardization. ISO 6872: 2008.: Dentistry-ceramic materials). The results were described by descriptive statistics and Mann-Whitney test. The mean (average value) and standard error of measurements (SEM) for all the roughness parameters are presented.

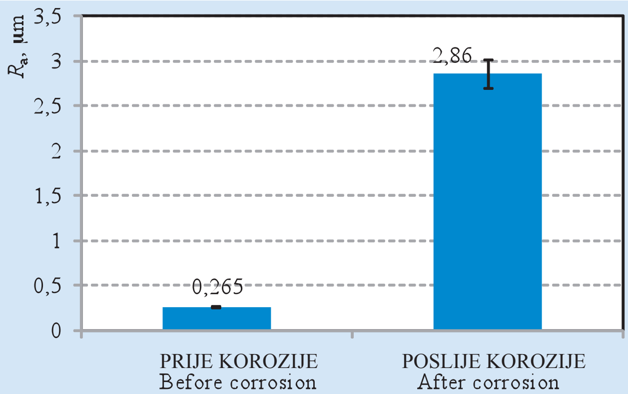
Results

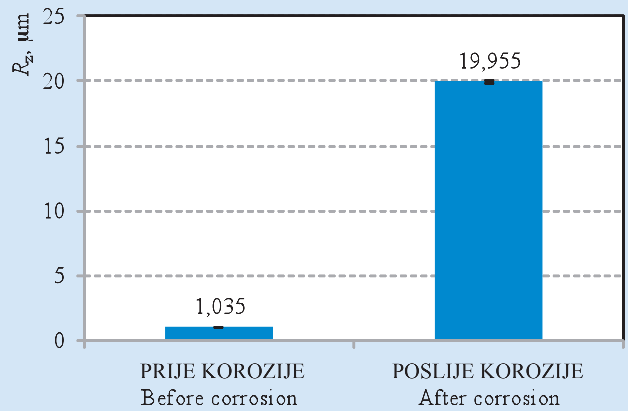
To assess the corrosion reactivity of Y-TZP dental ceramics samples, the method of monitoring changes in surface roughness as a consequence of 4% solution of acetic acid is used. Diagrams of the roughness profile of glazed Y-TZP dental ceramics before and after exposure to corrosive environment of 4 wt. % CH_3COOH aqueous solution are shown in Figure 1. Diagrams of the roughness profile show higher penetration depth in all surface areas after exposure to 4 wt. % CH_3COOH aqueous solution (Figure 1 B) compared to the starting condition (Figure 1A). The resulting values of following roughness parameters: arithmetic mean deviation (R_a), average maximum height of the profile (R_z) and maximum roughness depth (R_{max}) before and after immersion in 4 wt. % CH_3COOH aqueous solution are presented in Figures 2-4, respectively. The obtained results show that all measured roughness parameters have significantly increased after immersion in 4 wt. % CH_3COOH aqueous solution compared to the initial values. Weight loss, after immersion in 10 ml of 4 wt. % CH_3COOH at 80 °C for 768 hours, of investigated dental ceramics samples was 2.45 mg/cm^2 ± 0.026.

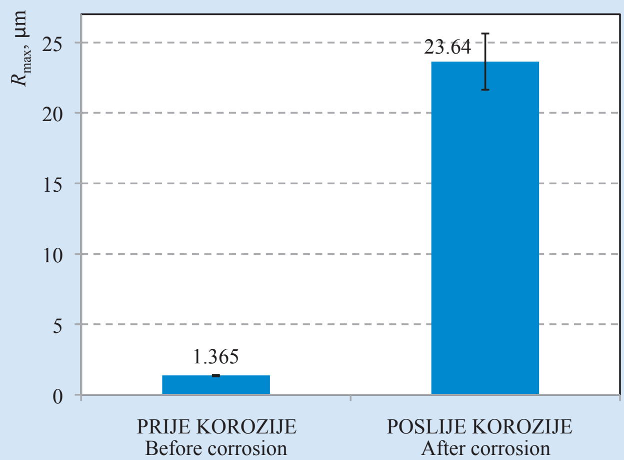


Slika 1. A: Profil hrapavosti zubne keramike uzorka A3G prije izlaganja 4-postotnoj otopini octene kiseline; B: Profil hrapavosti zubne keramike uzorka A3G poslije izlaganja 4-postotnoj otopini octene kiseline

Figure 1 The roughness profile of glazed Y-TZP dental ceramics sample before (A) and after (B) immersion in 4 wt. % CH_3COOH aqueous solution.







Slika 2. Vrijednosti u odstupanju od aritmetičke sredine (R_a) glazirane zubne keramike Y–TZP u uzorku prije i poslije korozije u 4-postotnoj otopini octene kiseline
Figure 2 Values (mean±SEM) of the arithmetic mean deviation (R_a) of glazed Y-TZP dental ceramics sample before and after corrosion in 4 wt. % CH_3COOH aqueous solution.
Slika 3. Vrijednosti u odstupanju od aritmetičke sredine (R_z) glazirane zubne keramike Y–TZP u uzorku prije i poslije korozije u 4-postotnoj otopini octene kiseline
Figure 3 Values (mean±SEM) of the average maximum height to f the profile (R_z) of glazed Y-TZP dental ceramics sample before and after corrosion in 4 wt. % CH_3COOH aqueous solution.
Slika 4. Vrijednosti u odstupanju od aritmetičke sredine (R_{max}) glazirane zubne keramike Y–TZP u uzorku prije i poslije korozije u 4-postotnoj otopini octene kiseline
Figure 4 Values of the maximum roughness depth (R_{max}) of glazed yttria partially tetragonal zirconia (Y-TZP) dental ceramics sample before and after corrosion in 4 wt. % CH_3COOH aqueous solution.

Rasprava

Kemijska degradacija materijala jest promjena strukture materijala uvjetovana okolišem, što mu može promijeniti svojstava. Degradacija se također može shvatiti kao proces starenja materijala jer je uvjetovana vremenom. U tom vremenu različiti mehanizmi (kemijski i fizikalni) djeluju paralelno, brže ili sporije. U ovom je radu za ocjenu korozijskog *ponašanja* cirkonij-oksidne keramike primijenjena metoda praćenja promjene hrapavosti površine kao posljedice djelovanja agresivnog medija. Mehanizam odgovoran za korozijske procese izlučivanja iona jest kongruentno otapanje uz jednostavnu disocijaciju.

Y–TZP je monolitički keramički materijal za dentalnu uporabu. Izvorno je namijenjen za osiguranje dugotrajnog i estetski prihvatljivog terapijskog rješenja koje bi zamijenilo metalnu konstrukciju, pogotovo za stražnje dijelove zubnog niza i u ograničenim interokluzijskim prostorima.

Transformacija u strukturi keramike Y–TZP događa se zbog naprezanja u materijalu. No, vodeni medij također pridonosi promjeni strukture. Kobayashiet je 1981. godine (15) prvi zapazio da transformaciju može potaknuti i niska temperatura u vlažnom okolišu.

Milleding je ustvrdio da se hrapavost površine tradicionalne leucitne keramike povećava u odnosu na početne uvjete nakon 18 sati izlaganja 4-postotnoj octenoj kiselini na 80 ° C (16).

Discussion

Chemical degradation of materials is changing the structure of the material, caused by the environment which can lead to changes in properties of the material. Degradation can also be seen as a process of material aging, because it is determined by time. During that time, different mechanisms (chemical and physical) act simultaneously, at a faster or a slower pace. In this study, to assess the corrosion of behaviour of zirconium, the method of monitoring changes in surface roughness as a result of the aggressive media was used. The mechanism responsible for the corrosion processes elution is congruent melting with simple dissociation.

Solid Y-TZP is a monolithic material for dental applications. The material was originally intended to provide a durable, more aesthetic alternative to posterior porcelain fused to metal restorations or cast gold restorations for demanding situations such as bruxers and areas with limited occlusal space.

The transformation in the structure of the Y-TZP occurs due to stress in the material; however, an aqueous medium also contributes to the change.

In 1981, Kobayashiet (15) first noticed that the t-m transformation can also be initiated by ageing at low temperature in humid environment. It is important to understand the interaction of water vapour or some solid saliva with the natural defects of the material. One simple way to study this

Jakovac i suradnici (17) proučavali su brzinu korozije zubne silikatne keramike. Ispitivanje je provedeno mjerenjem količine izlučenih iona Na^+, K^+, Mg^{2+}, Si^{4+}i Al^{3+} iz zubnih gliničnih keramika (kalijev aluminosilikat $KAlSi_3O_8$) i staklokeramičkih materijala (apatitne i litij- disilikatne keramike) nakon 16 sati izloženosti otopini octene kiseline. Zbog nedostatka staklene matrice, polikristalinične oksidne keramike pokazuju bolju kemijsku stabilnost nego silikatne.

Kukuattakoon je obavio istraživanje slično našem na silikatnim keramikama i u upola kraćem vremenu (18) te je dobio veliko povećanje parametara hrapavosti i značajnu količinu izlučenih alkalnih iona na uzorcima fluoroapatitnih keramika.

Asai je zaključio kako nema značajne razlike u mjerenju savojne čvrstoće između poliranih i glaziranih skupina uzoraka različitih silikatnih keramika. Ti rezultati podudaraju se s ranijim studijama u kojima glazura nadomjeska nije poboljšala čvrstoću keramičkih materijala (19).

Anusavice navodi da je gubitak mase kod triju različitih staklokeramičkih sustava mjeren pri pH-vrijednostima od 1, 9 i 11, bio najviši kod pH-vrijednosti 11 (20).

U ovom radu izmjeren je gubitak mase od 2,45 ± 0,026 mg/cm^2 i to se može pripisati otapanju glazure.

Mehulić uspoređuje hrapavost površine glazirane i neglazirane glinične keramike nakon izlaganja korozivnom mediju koristeći se mikroskopom atomarnih sila (AFM-a) i ističe da je površina glazirane keramike u odnosu na neglaziranu znatno postojanija u korozivnom mediju. Vrijednosti površinske hrapavosti ispitivane keramike visoke su i značajno variraju za različite načine obrade površine. Glazirana površina glinične keramike znatno je manje hrapava nego neglazirana. U usporedbi s glaziranjem, poliranje neglazirane površine nije smanjilo hrapavost do zadovoljavajuće razine (21,22).

Zaključak

Površinska hrapavost glazirane Y–TZP keramike značajno se povećala nakon izlaganja 4-postotnoj vodenoj otopini octene kiseline. Ta promjena u vrlo kiselim uvjetima u usnoj šupljini može nepovoljno utjecati na antagonistički zub ili nadomjestak.

Zahvale

Rad je pripremljen u sklopu znanstveno-istraživačkih projekata *Istraživanje keramičkih materijala i alergija u stomatološkoj protetici* (065-0650446-0435) i *Istraživanje strukture i svojstava tehničke keramike i keramičkih prevlaka* (120-1201833-1789) koje je financiralo Ministarstvo znanosti, obrazovanja i sporta Republike Hrvatske.

Posebno zahvaljujemo dr. Josefu Rothautu iz *BruxZir* Glidewell Laboratoriesa na donaciji uzoraka keramike.

is by producing artificial changes in the ceramics by exposing it to water or to an acidic environment, both of which strongly affect the stability of the surface area.

Milleding found that traditional leucite-containing porcelains displayed an increase in surface roughness compared to baseline conditions when kept in 4% acetic acid at 80°C for 18 h (16). Jakovac et al. found that the highest leaching of the ions was shown for the feldspathic ceramics and the lowest for the glass ceramics specimens (17).

Our samples were exposed about three and a half times longer to acidic medium, as opposed to Kukiattrakoon's fluorapatite–leucite porcelain. It exhibits significant leaching of various ions to varying degrees and an increase in roughness after being immersed in acidic agents (18).

Asai found no significant differences in compressive fracture strengths between the overglazed and polished groups. These results correspond to previous studies where glazing did not improve the strength of ceramic materials (19).

Anusavice found that weight loss for the three glass-ceramic systems was highest in pH 11 buffer solution, which represents an unlikely *in vivo* environment (20).

We found that weight loss of 2.45 mg/cm^2 ± 0.026 could be ascribed to the dissolution of glaze. Mehulić found that the pre- and post-corrosion AFM images of the surfaces of the feldspathic ceramics samples clearly showed that the glazed surfaces are much less prone to deterioration by corrosion than the unglazed ones (21, 22).

Conclusion

Due to the corrosion of the glazed Y-TZP ceramics after exposure to 4 wt. % CH_3COOH aqueous solution, all measured surface roughness parameters have increased. The obtained measurements of weight loss indicate that the deposited glaze on Y-TZP ceramics surface dissolves due to the corrosion process in the investigated media. This change, in highly acidic conditions in the oral cavity may be unfavourable for antagonistic wear. Because of the lack of glass matrix, polycrystalline oxide ceramics show better chemical stability than feldsphatic and glass ceramics.

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Abstract
Introduction: Among dental applications, the zirconia based ceramics are widespread because of their general properties. The changes in superficial surface roughness correspond to the structural changes in the material caused by the influence of corrosion. The aim of this study was to determine chemical stability of glazed Y-TZP using surface roughness measurements. **Materials and methods***:* Five samples of Y-TZP material BruxZir (Glidewell Laboratories Š 2012.) with the addition of pigment A3 were sintered, polished and glazed to imitate the finishing process in producing monolithic crowns. After determining the mass of the sample, each sample was immersed in 10 ml of 4 wt. % CH_3COOH aqueous solution. The roughness was measured five times before and after immersion. **Results:** All measured roughness parameters have significantly increased, showing higher penetration depth in all surface areas after immersion in 4 wt. % CH_3COOH aqueous solution compared to the initial values. Weight loss of investigated dental ceramics samples was 2.45 mg/cm^2 ± 0.026. **Conclusion:** Highly acidic conditions augment surface roughness of Y-TZP glazed dental ceramics.

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Dental Porcelain; Surface Properties; Corrosion

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