

Iruthayaraj Vinnarasi Suganya, Anita Nilavan,
Susai Rajendran*

¹Corrosion Research Centre, St Antony's College of Arts and Sciences for women, Dindigul, (Affiliated to Mother Teresa Women's University, Kadaikanal) Tamil Nadu, India.

Scientific paper

ISSN 0351-9465, E-ISSN 2466-2585

<https://doi.org/10.62638/ZasMat1574>



Zastita Materijala 67 ()
(2026)

The impact of candies on the corrosion resistance of orthodontic wires composed of SS 316 L alloy and SS 18/8 alloy when immersed in artificial saliva

ABSTRACT

Properly aligned teeth are visually appealing. Nevertheless, certain individuals possess teeth that are inherently misaligned. To address this issue, orthodontists employ orthodontic wires. After these wires are installed, individuals may consume a range of food items, drinks, and medications, which could lead to the deterioration of the orthodontic wires. Furthermore, the wire undergoes corrosion upon contact with saliva. This research investigates the corrosion resistance of orthodontic wires composed of SS 316 L alloy and SS 18/8 alloy when submerged in artificial saliva, both with and without the presence of three different types of candies. A polarization study has been employed to carry out this analysis. The results reveal that: Individuals with orthodontic wires made from SS 316 L and SS 18/8 alloys can safely enjoy candies A [Cofsils (Ginger)], B [Takha Masala Jelly], and C [Candy Man (Eclairs)]. Additionally, the orthodontic wire fabricated from SS 316 L exhibits superior performance in comparison to the wire made from SS 18/8 alloy. The surface morphology has been examined using SEM, AFM, and contact angle measurements. It has been noted that when SS 316 L is submerged in artificial saliva, the AFM image appears to be smoother compared to that of the SS 18/8 alloy. The AFM parameters for the SS 316 L alloy are comparatively lower than those for the SS 18/8 alloy. The contact angle for the SS 316 L alloy is relatively higher than that of the SS 18/8 alloy. The hydrophobicity of the SS 316 L alloy is also greater than that of the SS 18/8 alloy. Conversely, the wettability of the SS 316 L alloy is lower than that of the SS 18/8 alloy. This research concludes that individuals with orthodontic wires composed of SS 316 L and SS 18/8 alloys can safely enjoy candies A, B, and C without any reservations. Orthodontic wire made from SS 316 L is of higher quality compared to that made from SS 18/8 alloy.

Keywords: Corrosion resistance, Orthodontic wire, SS 316 L and SS 18/8 alloys Artificial Saliva, candies, SEM, AFM, contact angle measurements.

1. INTRODUCTION

Dental professionals employ orthodontic wires made from different alloys to ensure the correct positioning of teeth. A multitude of research studies has been carried out in this field [1-10].

Narmada et al. have clarified the release of nickel and chromium ions from stainless steel orthodontic brackets [1]. Stainless steel brackets, which contain nickel (Ni) and chromium (Cr), are affixed to patients' teeth and interact with the oral environment, leading to corrosion. The release of chromium and nickel metals can infiltrate the body and directly contact tissues.

Various factors may affect the release of ions from stainless steel orthodontic brackets, including temperature, microflora, oral enzymes, the quality and quantity of saliva, fluctuations in the acidity (pH) of saliva, plaque, proteins, and the physical and chemical characteristics of food and beverages. The data for this study was gathered through a literature review conducted via a database.

This research investigates the levels of Ni and Cr ions present in saliva as a result of the leaching of Ni and Cr from stainless steel brackets in vitro.

The quantities of Cr and Ni ions that are released from stainless steel orthodontic brackets into saliva are determined by the raw materials utilized in the brackets as well as the composition of saliva solutions, which are influenced by oral conditions and the mixture of artificial saliva [1].

The in vitro erosion of orthodontic brackets and wires under various conditions has been examined

*Corresponding author: Susai Rajendran

Email: susairajendran@gmail.com

Paper received: 28.03.2026.

Paper corrected: 30.04. 2026.

Paper accepted: 04.05.2026.

by Espinoza-Montero et al. The initial investigation produced 8,127 documents, and after the application of inclusion and exclusion criteria, 76 articles were selected. It is concluded that, Stainless steel, commonly used in orthodontic devices, exhibits the highest degree of wear. Moreover, it was found that acidic pH, alcohols, fluorides, and chlorides intensify the corrosion of orthodontic materials. Additionally, nickel released from brackets and wires may result in allergic reactions and gingival overgrowth in patients [2].

Liu et al. have clarified [3] the passive properties of TA10 in an oral environment that includes Coca-Cola. As the concentration of cola rises, the self-corrosion current density of the alloy significantly increases, with the corrosion resistance of the passive film being most effective in AS. However, the R_p in cola is reduced to half of the value observed in AS. The thickness of the passive film is roughly 9.5 nm in AS, 7.5 nm in AS + cola, and 6 nm in cola.

The passive film present in cola exhibits a greater number of defects, with a carrier density that is 1.55 times higher than that found in AS. It appears that cola obstructs the formation of the protective oxide, encourages the growth of high valence Ti-oxides, and raises the concentration of Mo-oxides within the passive film. These findings hold significant implications for the safe use of the alloy in complex oral environments [3].

The corrosion behavior of orthodontic wires in artificial saliva, especially when exposed to beverages, has been clarified by Christy Catherine Mary et al.[4]. The corrosion resistance of Ni-Ti alloy, 22 carat gold, SS 18/8 alloy, SS316L alloy, and thermoactive alloy in artificial saliva (AS), both without and with tea, has been evaluated using several methods such as polarization study, AC impedance spectra, UV-visible absorption and fluorescence spectra, SEM, AFM, and EDAX.

The results obtained from the polarization study and AC impedance spectra reveal that, among the materials evaluated, the Ni-Ti alloy demonstrates exceptional corrosion resistance. The ranking of corrosion resistance for the Ni-Ti alloy is as follows: AS+tea>AS>tea. Therefore, individuals who have orthodontic wires composed of Ni-Ti alloy can safely consume tea without any worries. [4].

Ahmed and Alshahrani have analyzed [5] the impact of fluoride and/or bovine albumin in conjunction with various common beverages on the electrochemical properties of ionic liquid coated Zirconium, with the objective of enhancing the performance of dental implants.

All findings demonstrated an improvement in corrosion resistance for the coated Zr, which is

ascribed to the advantageous effect of the adherent passive film that forms as a result of the thermal decomposition of IL [1-Butyl-3-methylimidazolium chloride ionic liquid ([Bmim]Cl) IL] molecules, along with the subsequent adsorption of the Imidazolium molecule in a planar configuration on the Zr surface.

Additionally, computational chemistry modeling was employed to assess the adsorption and corrosion inhibition efficacy of the IL at the metal surface interface, with the results closely aligning with those of the experimental study[5].

Nanjundan and Vimala have conducted an investigation [6] into the evaluation of frictional resistance and surface characteristics after orthodontic brackets and wires are immersed in different chemical solutions. The findings could have lasting consequences when acidic food substances are utilized in fixed orthodontic treatment [6]. Additionally, in vivo studies are crucial for evaluating the clinical impacts of acidic mediums within the oral environment during orthodontic procedures.

The issue of corrosion in acidic beverages and the subsequent restoration of microhardness in human dental enamel has been extensively studied by Gaalová et al. [7]. The researchers evaluated the impact of corrosion caused by acidic drinks, especially white wine with a pH of around 3.5, on the micromechanical properties of human teeth. Concurrently, we examined the effects of fluoride-containing mouthwash (pH ~4.4) and artificial saliva (pH ~5.3) regarding their protective roles against corrosion, as well as their capacity to restore mechanical properties through fluoridation and re-calcification.

The influence of these solutions on the Vickers hardness of dental enamel was assessed through the outcomes of corrosion tests conducted under quasi-dynamic conditions. These tests were executed at a temperature that simulates human body temperature (37°C). The results indicated a notable decrease in microhardness with extended exposure to white wine [7].

The influence of soft drinks on the liberation of metal ions from orthodontic devices has been examined by Mikulewicz et al. [8]. The overall quantity of ions released from the device into orange juice and Coca Cola(®) (respectively) during the research was quantified (μg): Ni (15.33; 37.75), Cr (3.604; 1.052), Fe (48.42; ≥ 156.1), Cu (57.87, 32.91), Mn (9.164; 41.16), Mo (9.999; 30.12), and Cd (0.5967; 2.173). The results indicated that orange juice did not facilitate the release of metal ions from orthodontic devices, while Coca Cola(®) resulted in a heightened release of Ni ions [8].

Abalos et al. performed an analysis [9] concerning the effects of low pH soft drinks on various surface patterns of Ni-Ti orthodontic archwires. The aim of this study was to evaluate how soft drinks influence the surface properties and corrosion behavior of Ni-Ti archwires. Archwires with distinct surface patterns (smooth, scratch, dimple, and crack) were chosen and analyzed using scanning electron microscopy and laser confocal microscopy. Immersion tests were conducted in artificial saliva (pH 6.7) in conjunction with a soft drink having a pH of 2.5 over a period of 28 days.

The results demonstrated a rise in surface imperfections and/or roughness in the dimple, crack, and scratch patterns as the duration of immersion increased, accompanied by a decline in corrosion resistance. A relationship between the surface pattern and the extent of corrosion in Ni-Ti archwires subjected to low pH soft drinks has been identified. Subsequent research should take into account the surface pattern, and manufacturing methods that result in surface defects, especially cracks, ought to be circumvented [9].

Duffó and Farina conducted an analysis [10] on the corrosion characteristics of a dental alloy when exposed to a range of beverages and drinks. The objective of this study was to systematically examine how various beverages (such as alcoholic drinks, both natural and artificial fruit juices, vinegar, soft drinks, and milk) influence the corrosion behavior of an aluminum-bronze dental alloy.

The outcomes were contrasted with those derived from artificial saliva and a sodium chloride solution. The substance being analyzed was an aluminum-bronze alloy, commonly utilized in Latin American nations because of its resemblance to yellow gold alloys and for financial considerations [10].

This study aims to examine the effect of three different types of candies on the corrosion resistance of two alloys, specifically SS 316 L alloy and SS 18/8 alloy, when immersed in artificial saliva. To achieve this, a polarization study has been employed.

2. EXPERIMENTAL

2.1. Preparation of artificial saliva

The formulation of artificial saliva was carried out utilizing the composition established by Fusayama, Meyer. Artificial saliva was prepared in laboratory and the composition, of artificial saliva was as follows: KCl - 0.4 g/L, NaCl - 0.4 g/L, CaCl₂.2H₂O - 0.906 g/L, NaH₂PO₄.2H₂O - 0.690 g/L, Na₂S.9H₂O - 0.005 g/L, urea - 1 g/L. The solution exhibited a pH level of 6.5.

2.2. SS 316 L alloy

316L stainless steel is classified as an austenitic stainless steel that falls under the standard CrNiMo stainless steels. The designation 'L' in 316L indicates low carbon content ($\leq 0.030\%$). This grade is a low carbon variant of 316, and the addition of 2 to 3% molybdenum significantly improves its corrosion resistance. 316L is recognized as both food grade and marine grade, and is also referred to as SS 316L and AISIUNSS31603.

This particular grade of stainless steel showcases remarkable resistance to intergranular corrosion and maintains exceptional corrosion resistance even in demanding conditions, such as high humidity, increased temperatures, and contact with corrosive materials.

Additionally, it exhibits commendable welding and processing characteristics, enabling it to be readily formed into various products to meet a wide range of needs.

2.3. The chemical composition of stainless steel 316L typically includes:

Chromium (Cr): 16% to 18%, Nickel (Ni): 10% to 14%, Molybdenum (Mo): 2% to 3%, Carbon (C): $\leq 0.030\%$, Silicon (Si): $\leq 0.750\%$, Manganese (Mn): $\leq 2.00\%$, Phosphorus (P): $\leq 0.045\%$, Nitrogen (N): $\leq 0.100\%$, Sulfur (S): $\leq 0.030\%$.

This formulation enhances its resistance to corrosion and overall durability in comparison to other grades of stainless steel [11].

2.4. SS 18/8 alloy

18/8 stainless steel, commonly referred to as 304 stainless steel, denotes a specific chemical composition comprising 18% chromium (Cr) and 8% nickel (Ni).

This category of steel encompasses 304 and its variants, including 304L, 304N, and 304LN, and is the most widely used material. It demonstrates exceptional corrosion resistance in mild environments, as well as advantageous weldability and mechanical properties [12].

2.5. Candies

The candies listed below were utilized in the current study. Candy A: Cofsils (Ginger).

Candy B :Takha Masala Jelly and Candy C:Candy Man (Eclairs)

2.6. Electrochemical studies

Electrochemical investigations, including polarization analysis and AC impedance spectroscopy, have been extensively employed in evaluating corrosion inhibition.

2.6.1. Polarization study

In the current study, the corrosion resistance of SS 316 L alloy and SS 18/8 alloy in artificial saliva, both with and without the presence of candies A, B, and C, was assessed through a polarization analysis [13-17]. The experiments were performed at ambient temperature. Polarization tests were executed utilizing a CHI electrochemical workstation, which was outfitted with an impedance model 660A that included an iR compensation feature.

A three-electrode cell configuration was employed, using either SS 316 L alloy or SS 18/8 alloy as the working electrode, platinum as the counter electrode, and a saturated calomel electrode (SCE) as the reference electrode.

From polarization study, corrosion parameters such as corrosion potential (E_{corr}), corrosion current (I_{corr}), Tafel slopes anodic = b_a and cathodic = b_c and linear polarization resistance (LPR) value were calculated.

3. RESULTS AND DISCUSSION

The corrosion resistance of orthodontic wires composed of SS 316 L and SS 18/8 alloys has been assessed by immersing them in artificial saliva, both with and without the inclusion of candies A, B, and C. This evaluation was conducted utilizing the polarization technique. The findings are comprehensively detailed and analyzed [13-17].

3.1. Analysis of polarization curves

The polarization curves for orthodontic wires composed of SS 316 L and SS 18/8 alloys, when immersed in artificial saliva with and without the inclusion of the three candies, are illustrated in Figures 1 and 2.

The corrosion parameters, encompassing corrosion potential (E_{corr}), cathodic Tafel slope (b_c), anodic Tafel slope (b_a), linear polarization resistance (LPR), and corrosion current (I_{corr}), are detailed in Table 1.

In the study of polarization, an enhancement in the corrosion resistance of the working electrode is associated with a rise in linear polarization resistance (LPR), while a simultaneous reduction in corrosion current is noted, as demonstrated in Figure 9.

Based on these principles the following implications are drawn.

- The corrosion resistance of SS 316 L alloy in artificial saliva is enhanced in the presence of candy A.
- The corrosion resistance of SS 316 L alloy in artificial saliva is enhanced in the presence of candy B.
- The corrosion resistance of SS 316 L alloy in artificial saliva is enhanced in the presence of candy C.
- The corrosion resistance of SS 18/8 alloy in artificial saliva is enhanced in the presence of candy A.
- The corrosion resistance of SS 18/8 alloy in artificial saliva is enhanced in the presence of candy B.
- The corrosion resistance of SS 18/8 alloy in artificial saliva is enhanced in the presence of candy C.
- Individuals who have orthodontic wires made from SS 316 L and SS 18/8 alloys can confidently consume candies A, B, and C without any concerns.

Orthodontic wire made from SS 316 L is superior to orthodontic wire made from SS 18/8 alloy.

Table 1. The corrosion characteristics of orthodontic wires made from SS 316 L and SS 18/8 alloys when submerged in artificial saliva, both in the absence and presence of the three candies.

System	E_{corr} mV vs SCE	b_c mV/decade	b_a mV/decade	LPR Ohmcm ²	I_{corr} A/cm ²
SS 316 L in AS	-601	154	214	271685	14.47x10 ⁻⁸
SS 316 L in AS + candy A	-593	181	208	1583699	2.661x10 ⁻⁸
SS 316 L in AS + candy B	-673	158	215	1266070	3.124 x10 ⁻⁸
SS 316 L in AS + candy C	-631	160	216	909899	4.386 x10 ⁻⁸
SS 18/8 in AS	-536	207	230	55252	8.570 x10 ⁻⁷
SS 18/8in AS + candy A	-637	165	212	242274	1.662 x10 ⁻⁷
SS 18/8in AS + candy B	-593	185	196	297389	1.393 x10 ⁻⁷
SS 18/8in AS + candy C	-432	212	190	217704	2.004 x10 ⁻⁷
<i>Implications</i>	1. Individuals utilizing orthodontic wires made from SS 316 L and SS 18/8 alloys can confidently consume candies A, B, and C without concern. 2. Orthodontic wire made from SS 316 L is superior to that made from SS 18/8 alloy.				

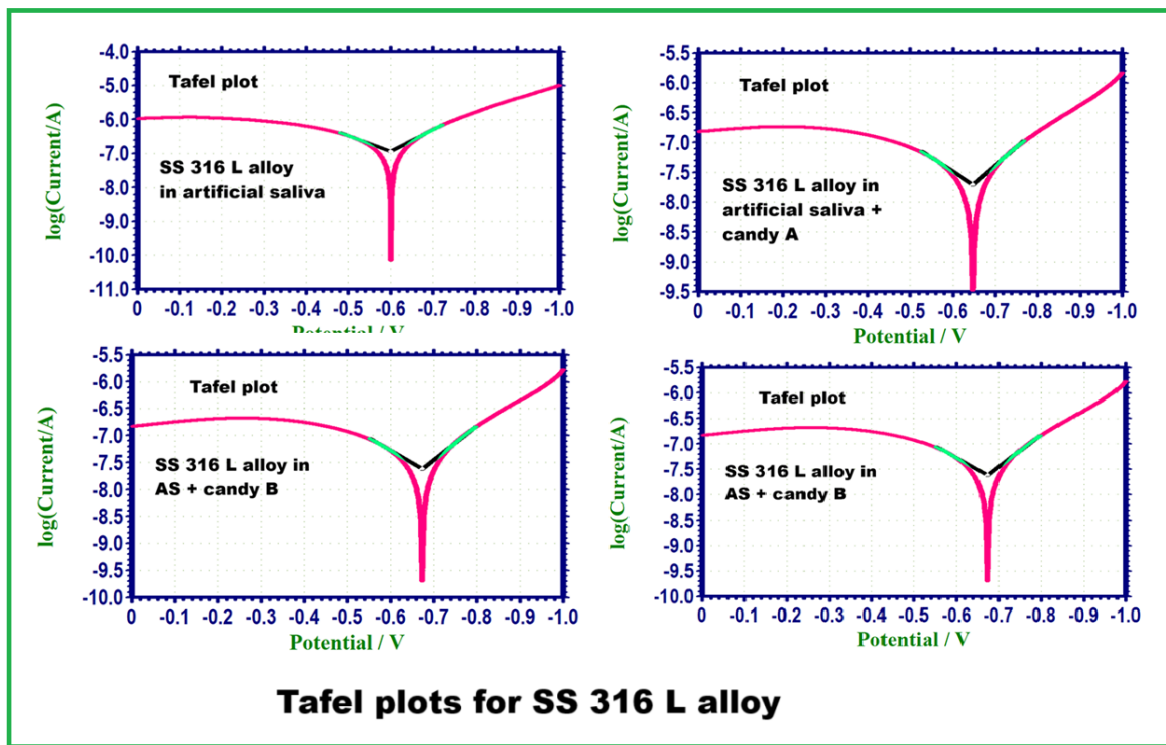


Figure 1. Tafel plots of SS 316 L alloy immersed in artificial saliva in the absence and presence of various candies

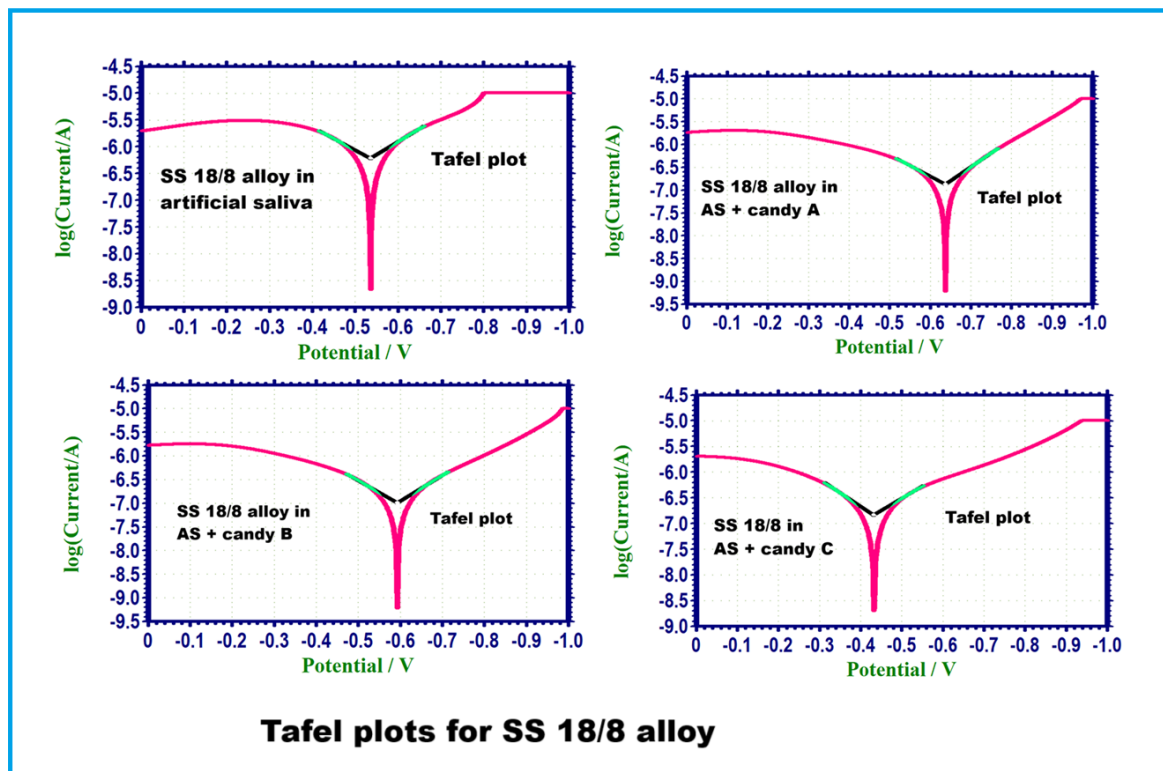


Figure 2. Tafel plots of SS 18/8 alloy immersed in artificial saliva in the absence and presence of various candies

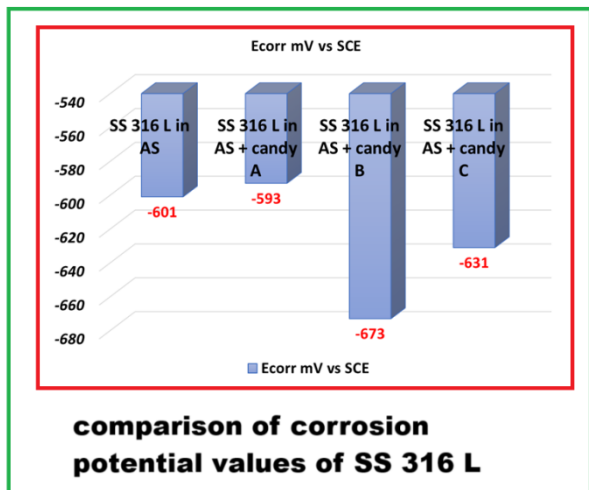


Figure 3. Comparison of corrosion potential values of SS 316 L alloy immersed in artificial saliva in the absence and presence of various candies.

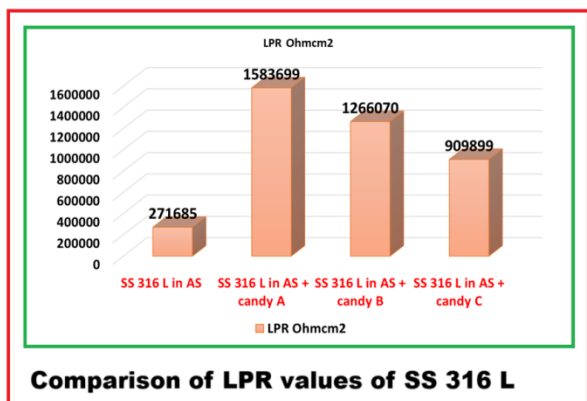


Figure 4. Comparison of LPR values of SS 316 L alloy immersed in artificial saliva in the absence and presence of various candies.

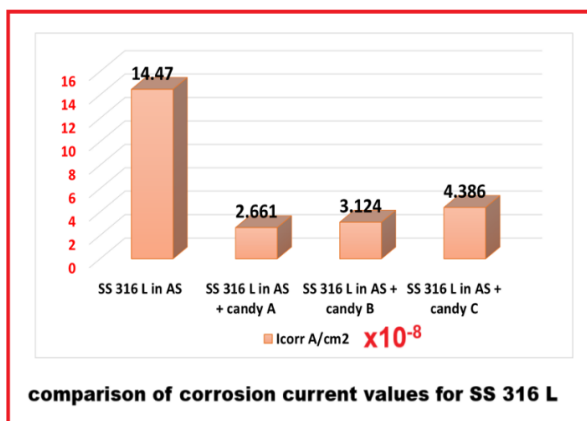


Figure 5. Comparison of corrosion current values of SS 316 L alloy immersed in artificial saliva in the absence and presence of various candies

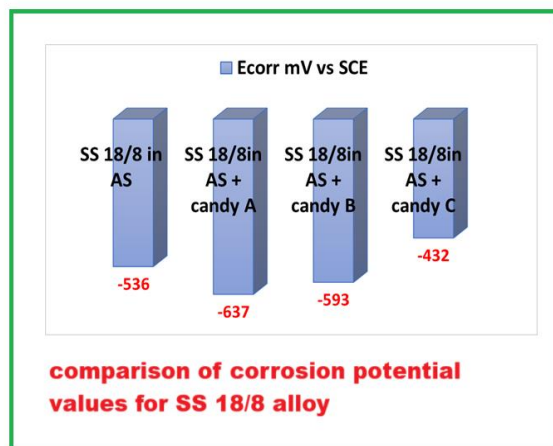


Figure 6. Comparison of corrosion potential values of SS 18/8 alloy immersed in artificial saliva in the absence and presence of various candies.

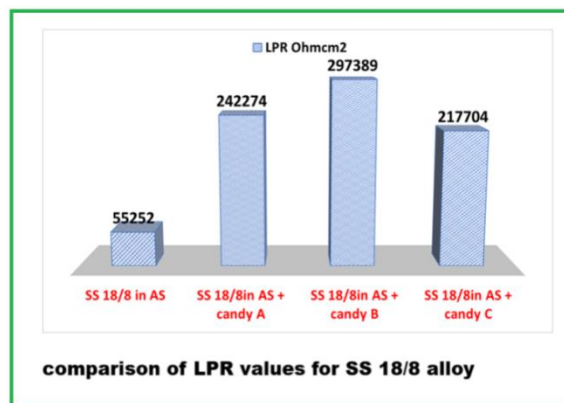


Figure 7. Comparison of LPR values of SS 18/8 alloy immersed in artificial saliva in the absence and presence of various candies.

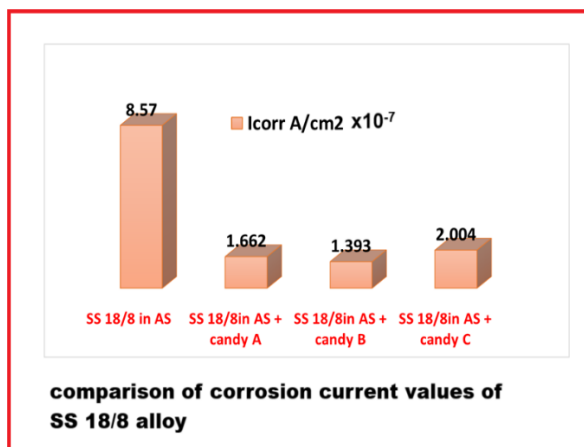


Figure 8. Comparison of corrosion current values of SS 18/8 alloy immersed in artificial saliva in the absence and presence of various candies.

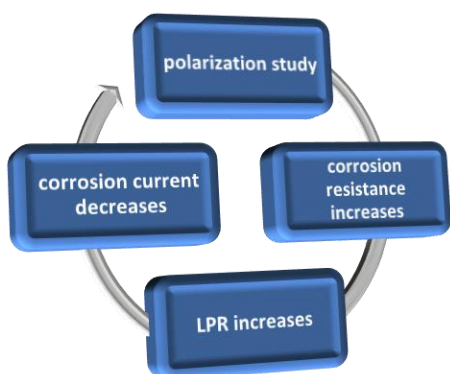


Figure 9 . Correlation among corrosion parameters of polarization study

3.2. Analysis of SEM images

The analysis of SEM images has been employed in studies concerning corrosion inhibition [18-22]. A high level of corrosion protection results in a relatively smooth film surface. The film will exhibit uniformity. Conversely, when the system experiences corrosion or when the corrosion protection is minimal, the surface becomes rough. Pits will develop, leading to a lack of uniformity in the film. These observations, along with an examination of Figure 10, indicate that the SS 316 L alloy demonstrates greater corrosion resistance compared to the SS 18/8 alloy in artificial saliva. This finding aligns with the outcomes of the electrochemical study.

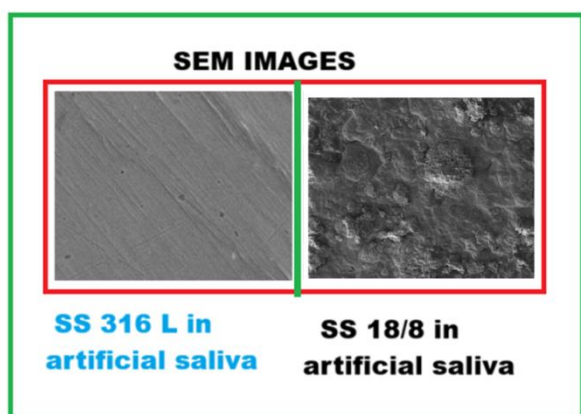


Figure 10. Comparison of SEM images of SS 316 L and also SS 18/8 in artificial saliva

3.3. Analysis of contact angle measurements

Contact angle measurements have been utilized in studies concerning corrosion inhibition[23-27]. When a surface experiences corrosion or when its protective characteristics diminish, the contact angle of that surface

decreases. Consequently, wettability increases, and hydrophobicity diminishes. The water-repelling properties are reduced. Conversely, when a surface remains free from corrosion or when its protective qualities are relatively strong, the contact angle increases. This results in decreased wettability and increased hydrophobicity. These observations, along with an examination of Figure 11, indicate that the SS 316 L alloy exhibits greater corrosion resistance compared to the SS 18/8 alloy in artificial saliva. This finding aligns with the outcomes of the electrochemical analysis, specifically the polarization study.

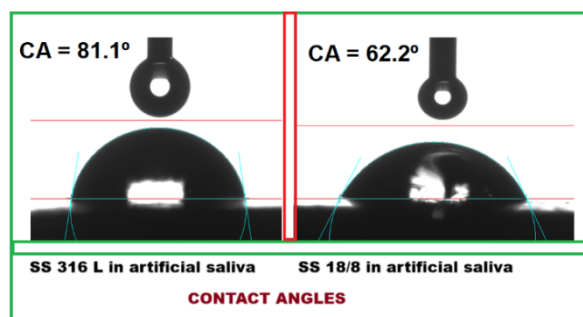


Figure 11..Comparison of contact angles of SS 316 L and also SS 18/8 in artificial saliva

3.4. Analysis of AFM images

The examination of AFM images has been employed in studies concerning corrosion inhibition[28-32]. When the level of corrosion protection is significant, the surface roughness of the film tends to be comparatively low. The AFM parameters, including RMS Roughness (nm) (Rq), Average Roughness (nm) (Ra), and Maximum peak-to-peak height (nm) (Ry), will also be relatively low.

Table 2. The surface characteristics of SS 316 L and SS 18/8 alloys in artificial saliva as determined by AFM analysis

System	Average Roughness (Ra) (nm)	RMS Roughness (Rq) (nm)	Maximum peak - valley height (Ry) (nm)
SS 316 L in AS	35.13	40.993	182.19
SS 18/8 in AS	262.3	361.75	1623.4

Conversely, when the system experiences corrosion or when the corrosion protection is minimal, the surface roughness tends to increase. The AFM parameters will be comparatively elevated. An examination of Figures 12, 13, and

14, along with Table 2, indicates that the SS 316 L alloy exhibits greater corrosion resistance than the SS 18/8 alloy in artificial saliva. This finding aligns with the outcomes of the electrochemical study and the analysis of SEM images.

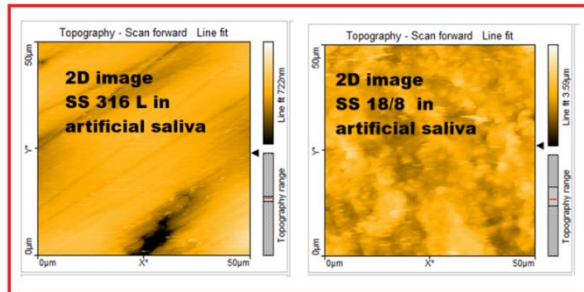


Figure 12. Comparison of 2D images of SS 316 L and also SS 18/8 in artificial saliva

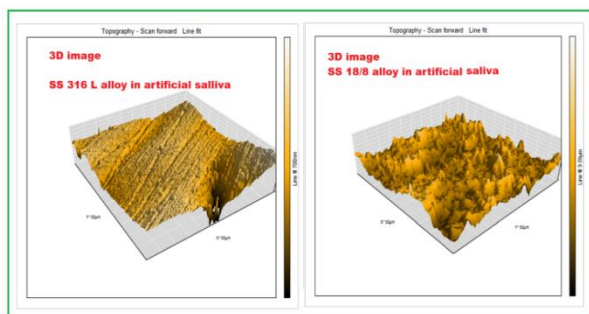


Figure 13. Comparison of 3D images of SS 316 L and also SS 18/8 in artificial saliva

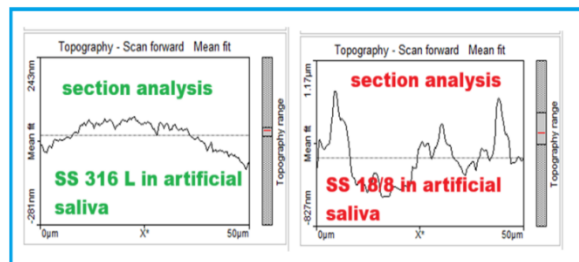


Figure 14. Comparison of section analysis of SS 316 L and also SS 18/8 in artificial saliva

4. CONCLUSIONS

- This research investigates the corrosion resistance of orthodontic wires composed of SS 316 L alloy and SS 18/8 alloy when submerged in artificial saliva, both with and without the presence of three different types of candies.
- A polarization study has been employed to carry out this analysis.
- The results reveal that: Individuals with orthodontic wires made from SS 316 L and SS 18/8 alloys can safely enjoy candies A [Cofsils

(Ginger)], B [Takha Masala Jelly], and C [Candy Man (Eclairs)].

- Additionally, the orthodontic wire fabricated from SS 316 L exhibits superior performance in comparison to the wire made from SS 18/8 alloy.
- The surface morphology has been examined using SEM, AFM, and contact angle measurements.
- It has been noted that when SS 316 L is submerged in artificial saliva, the AFM image appears to be smoother compared to that of the SS 18/8 alloy.
- The AFM parameters for the SS 316 L alloy are comparatively lower than those for the SS 18/8 alloy.
- The contact angle for the SS 316 L alloy is relatively higher than that of the SS 18/8 alloy.
- The hydrophobicity of the SS 316 L alloy is also greater than that of the SS 18/8 alloy.
- Conversely, the wettability of the SS 316 L alloy is lower than that of the SS 18/8 alloy.
- This research concludes that individuals with orthodontic wires composed of SS 316 L and SS 18/8 alloys can safely enjoy candies A, B, and C without any reservations.
- Orthodontic wire made from SS 316 L is of higher quality compared to that made from SS 18/8 alloy.

5. REFERENCES

- [1] I.B. Narmada, Alida, N.J. Farha, I.D. Virgianti, P.P. Larasati, A.P. Nugraha, T.N.E.B.T.A. Noor (2023) Release of nickel and chromium ions from stainless steel orthodontics bracket: A review, Res. J. Pharm. Technol., 16 (10), 4935–4942, <https://doi.org/10.52711/0974-360X.2023.00800>
- [2] P.J. Espinoza-Montero, M. Montero-Jiménez, L. Fernández, J.L. Paz, J.L. Piñeiros, S.M. Ceballos (2022) In vitro wearing away of orthodontic brackets and wires in different conditions: A review, Heliyon., 8 (9), e10560. <https://doi.org/10.1016/j.heliyon.2022.e10560>
- [3] M. Liu, J. Li, D. Li, L. Zheng (2021) The passive properties of TA10 in Coca-Cola containing oral environment, Anti-Corros. Methods Mater., 68 (1), 9–16. <https://doi.org/10.1108/ACMM-05-2020-2312>
- [4] A.C.C. Mary, J. Jeyasundari, V.R. Nazeera Banu, R. Dorothy, S. Rajendran, S. Senthil Kumaran, A.P.P. Regis (2020) Corrosion behavior of orthodontic wires in artificial saliva with presence of beverage, Nanotechnol. Beverage Ind., 471–504. <https://doi.org/10.1016/B978-0-12-819941-1.00016-X>
- [5] R.A. Ahmed, Alshahrani (2019) Influence of fluoride and/or bovine albumin and beverages on electrochemical properties of ionic liquid coated zirconium, J. Mol. Liq., 279, 548–560. <https://doi.org/10.1016/j.molliq.2019.01.168>
- [6] K. Nanjundan, G. Vimala (2016) Evaluation of frictional resistance and surface characteristics after immersion of orthodontic brackets and wire, Indian

- J. Dent. Res., 27 (5), 513–520.
<https://doi.org/10.4103/0970-9290.195641>
- [7] P. Gaalová, D. Galusková, J. Kováč, D. Kováč, D. Galusek (2016) Corrosion in acidic beverages and recovery of microhardness of enamel, *Ceram. Silik.*, 60 (2), 105–114.
<https://doi.org/10.13168/cs.2016.0016>
- [8] M. Mikulewicz, P. Wołowicz, B.W. Loster, K. Chojnacka (2015) Do soft drinks affect metal ion release from orthodontic appliances?, *J. Trace Elem. Med. Biol.*, 31, 74–77.
<https://doi.org/10.1016/j.jtemb.2015.03.007>
- [9] C. Abalos, A. Paul, A. Mendoza, E. Solano, C. Palazon, F.J. Gil (2013) Influence of soft drinks with low pH on Ni-Ti archwires, *J. Mater. Eng. Perform.*, 22 (3), 759–766
- [10] G.S. Duffó, S.B. Farina (2009) Corrosion behaviour of a dental alloy in beverages, *Mater. Chem. Phys.*, 115 (1), 235–238.
<https://doi.org/10.1016/j.matchemphys.2008.11.053>
- [11] ss 316l chemical composition - Search
<https://www.bing.com/search?q=ss+316l+chemical+composition&form=ANNTH1&refig=2a533a39ddfa490b924d48f3b2e1580a&pc=HCTS&pq=ss+316l+&pqlth=8&assgl=28&sgcn=ss+316l+chemical+composition&q=AS&sgtpv=AS&smvpcn=0&swbcn=10&sctcn=0&sc=10-8&sp=2&ghc=0&cvid=2a533a39ddfa490b924d48f3b2e1580a&clkatsg=1&hsmssg=018/8> Stainless Steel Properties, Yield Strength, Composition, Density, Tensile Strength, Hardness
<https://www.theworldmaterial.com/what-is-18-8-stainless-steel/>
- [12] M.D. Boamah, T. Kaspar, Y. Zhao, Z. Wang, K.M. Rosso (2026) Vibrational sum frequency generation spectroscopy reveals the inertness of chromium oxide (001) surfaces, *J. Colloid Interface Sci.*, 701, 138631. <https://doi.org/10.1016/j.jcis.2026.138631>
- [13] N. Ferraa, M. Ouakki, K. Alaoui, M. Cherkaoui, M. BennaniZiatni (2025) Sustainable enhancement of steel corrosion inhibition in saline environments, *J. Mol. Struct.*, 1348, 143480.
<https://doi.org/10.1016/j.molstruc.2025.143480>
- [14] K.A. Mechken, L. Ouksel, A. Bouchama, S. Saidi-Besbes (2025) Triazole-based quaternary ammonium surfactant inhibitor for XC48 carbon steel corrosion in 1M HCl, *J. Mol. Struct.*, 1348, 143425.
<https://doi.org/10.1016/j.molstruc.2025.143425>
- [15] X. Geng, Q. Wang, Q. Wang, H. Jia, H. Yan (2025) Influence of molecular structures on corrosion inhibition properties of ionic liquids, *J. Mol. Struct.*, 1347, 143315.
<https://doi.org/10.1016/j.molstruc.2025.143315>
- [16] O. Boutaqqqa, W. Ettahiri, M. Adardour, S.K. Wiedmer, M. Taleb (2025) Benzimidazole derivatives as corrosion inhibitors for mild steel, *J. Mol. Struct.*, 1347, 143281.
<https://doi.org/10.1016/j.molstruc.2025.143281>
- [17] L. Tang, P. Du, P. Zhu, Y. Gao, J. Xu (2026) Green corrosion inhibition using agricultural byproduct extract, *J. Mol. Struct.*, 1349, 143631.
<https://doi.org/10.1016/j.molstruc.2026.143631>
- [18] O.S. Yadav, S. Kumar, K. Yadav, R. Sharma, R. Kumar (2026) Corrosion inhibition of Kala Bansa leaf extract on mild steel, *Port. Electrochim. Acta*, 44 (1), 27–45.
<https://doi.org/10.4152/pea.202601027>
- [19] A.H. Abdelrahman, S.K. Ramadan, M.E. Azab, A.A. Zaher, N.S. Abdelshafi (2025) Corrosion inhibition mechanism of surfactants on N80 steel, *J. Mol. Struct.*, 1348, 143369.
<https://doi.org/10.1016/j.molstruc.2025.143369>
- [20] Shaily, F. Zafar, A. Ghosal, T. Fatma, N. Nishat (2025) Nano silver-imposed polyurethane coating for corrosion protection, *J. Mol. Struct.*, 1348, 143333.
<https://doi.org/10.1016/j.molstruc.2025.143333>
- [21] M. Azogagh, A. Hmada, A. Barazzouq, M. Rafik, R. Hsissou (2025) Glycidyl ether epoxy resin for corrosion inhibition, *J. Mol. Struct.*, 1346, 143112.
<https://doi.org/10.1016/j.molstruc.2025.143112>
- [22] R. Li, L. Zhang, H. Liu, R. Qiu, Y. Ouyang (2025) Bio-inspired coatings on galvanized steel, *Colloids Surf. A*, 717, 136727,.
<https://doi.org/10.1016/j.colsurfa.2025.136727>
- [23] C. Shi, S. Deng, M. Tang, R. Lei, X. Li (2025) Quaternary ammonium surfactant inhibition on steel corrosion, *J. Mol. Struct.*, 1337, 142170.
<https://doi.org/10.1016/j.molstruc.2025.142170>
- [24] Z. Tang, P. Wang, Y. Song, A. Singh, Y. Lin (2025) Synergistic effect of imidazole derivatives on corrosion inhibition, *Appl. Surf. Sci.*, 701, 163239.
<https://doi.org/10.1016/j.apsusc.2025.163239>
- [25] S. Habib, S. Zafar, M. Shkooor, A. Dawoud, R.A. Shkooor (2025) Polyurethane composite coatings with zirconia nanoparticles for corrosion inhibition, *Surf. Coat. Technol.*, 511, 132316.
<https://doi.org/10.1016/j.surfcoat.2025.132316>
- [26] X. Zhang, Y. Diao, S. Guan, H. Chen, Q. Zhang (2025) Synergistic corrosion inhibition on mild steel in acidic environment, *Surf. Interfaces*, 72, 107308.
<https://doi.org/10.1016/j.surfint.2025.107308>
- [27] R.H. Aldahiri, M.A. Hussein, S.M.A. Al-Bukhari, A. Khan, R. Aslam (2025) Plant extract and KI synergistic corrosion protection of mild steel, *Sci. Rep.*, 15 (1), 3576.
<https://doi.org/10.1038/s41598-025-03576>
- [28] V.M. dos Santos, C.M. Fernandes, M.T.G. Sampaio, H. Lgaz, E.A. Ponzio (2025) Design of small molecules for corrosion inhibition, *Colloids Surf. A*, 726, 137874.
<https://doi.org/10.1016/j.colsurfa.2025.137874>
- [29] I. Azghay, B. Dikici, C. Zannagui, S. El Barkany, A. Salhi (2025) Benzimidazolium salts as corrosion inhibitors, *Colloids Surf. A*, 726, 137815.
<https://doi.org/10.1016/j.colsurfa.2025.137815>
- [30] X. Sun, W. Zhao, R. Wan, R. Wang, B. Tan (2025) Roxburgh pear leaf extract for copper corrosion inhibition, *J. Mol. Struct.*, 1346, 143238.
<https://doi.org/10.1016/j.molstruc.2025.143238>
- [31] C. Özkan, A.M. Armaki, E. Rahimi, P. Taheri, A. Mol (2025) Quasi-stable adsorption in corrosion inhibition, *Appl. Surf. Sci.*, 712, 164060.
<https://doi.org/10.1016/j.apsusc.2025.164060>

IZVOD

UTICAJ BOMBONA NA OTPORNOST NA KOROZIJU ORTODONTSKIH ŽICA SASTAVLJENIH OD LEGURE SS 316 L I LEGURE SS 18/8 KADA SE POTOPE U VEŠTAČKU PLJUVAČKU

Pravilno poravnati zubi su vizuelno privlačni. Ipak, određene osobe imaju zube koji su inherentno neusklađeni. Da bi rešili ovaj problem, ortodonti koriste ortodontske žice. Nakon što se ove žice instaliraju, osobe mogu konzumirati razne prehrambene proizvode, pića i lekove, što može dovesti do propadanja ortodontskih žica. Šta više, žica korodira pri kontaktu sa pljuvačkom. Ovo istraživanje istražuje otpornost na koroziju ortodontskih žica sastavljenih od legure SS 316 L i legure SS 18/8 kada se potope u veštačku pljuvačku, sa i bez prisustva tri različite vrste bombona. Za sprovođenje ove analize korišćena je studija polarizacije. Rezultati pokazuju da: Pojedinci sa ortodontskim žicama napravljenim od legura SS 316 L i SS 18/8 mogu bezbedno uživati u bombonama A [Cofsils (đumbir)], B [Takha Masala Jelly] i C [Candy Man (ekler)]. Pored toga, ortodontska žica napravljena od SS 316 L pokazuje superiorne performanse u poređenju sa žicom napravljenom od legure SS 18/8. Površinska morfologija je ispitana pomoću SEM, AFM i merenja kontaktnog ugla. Primećeno je da kada se SS 316 L potopi u veštačku pljuvačku, AFM slika izgleda glađe u poređenju sa onom kod legure SS 18/8. AFM parametri za leguru SS 316 L su uporedno niži od onih za leguru SS 18/8. Kontaktni ugao za leguru SS 316 L je relativno veći od onog kod legure SS 18/8. Hidrofobnost legure SS 316 L je takođe veća od one kod legure SS 18/8. Nasuprot tome, kvasivost legure SS 316 L je niža nego kod legure SS 18/8. Ovo istraživanje zaključuje da osobe sa ortodontskim žicama sastavljenim od legura SS 316 L i SS 18/8 mogu bezbedno da uživaju u bombonama A, B i C bez ikakvih rezervi. Ortodontska žica napravljena od SS 316 L je višeg kvaliteta u poređenju sa onom napravljenom od legure SS 18/8.

Ključne reči: Otpornost na koroziju, Ortodontska žica, legure SS 316 L i SS 18/8, Veštačka pljuvačka, bombone, SEM, AFM, merenja kontaktnog ugla.

Naučni rad

Rad primljen: 28.03.2026.

Rad korigovan: 30.04.2026.

Rad prihvaćen: 04.05.2026.

Susai Rajendran : <https://orcid.org/0009-0003-4184-2044>