Elemental, Morphological, and Corrosion Characterization of Different Surface States of Co-Cr Alloy for Prosthodontic Applications

Youssef S. Al Jabbari¹,²,*, Argiro Ntasi³, Mariana Gaintatzopoulou⁴, Wolf Dieter Mueller⁵, George Eliades⁶, El-Sayed M. Sherif³,⁷,¹, Spiros Zinelis³,¹

¹ Dental Biomaterials Research and Development Chair, College of Dentistry, King Saud University, Riyadh, Saudi Arabia
² Prosthetic Dental Sciences Department, College of Dentistry, King Saud University, Riyadh, Saudi Arabia
³ Department of Biomaterials, School of Dentistry, National and Kapodistrian University of Athens, Athens, Greece
⁴ Department of General & Specialist Dental Practice, College of Dentistry, University of Sharjah, Sharjah, United Arab Emirates
⁵ Dental and Biomaterials Research Group Dental School, “Charite” Medical University of Berlin, Germany
⁶ Center of Excellence for Research in Engineering Materials (CEREM), Advanced Manufacturing Institute, King Saud University, P. O. Box 800, Al-Riyadh 11421, Saudi Arabia
⁷ Electrochemistry and Corrosion Laboratory, Department of Physical Chemistry, National Research Centre (NRC), Dokki, 12622 Cairo, Egypt

*E-mail: yaljabbari@ksu.edu.sa
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In this study, four different groups were prepared in a cast model of an arch that received four implants made with a Co-Cr dental alloy. The surface of each group was prepared by four different surface treatments, including sandblasting with Al₂O₃ grains (SB), conventional finishing with dental burs (CF), milling with a CAD/CAM device (MIL), and electrodischarge machining (EDM). The characterization of the roughness parameters, morphology, elemental composition, and electrochemical properties of a dental Co-Cr alloy in different surface states exposed to an oral environment were reported. The electrochemical properties were tested with open-circuit potential (OCP) and anodic scan in Ringer’s solutions. The results of roughness parameters, elemental composition, OCP, corrosion potential and pitting potential were statistically analyzed by one-way ANOVA and the Tukey-Kramer multiple-comparison test at 95% confidence level. The roughness parameters classified the surfaces from smoothest to roughest according to the following order; CF,
MIL, EDM, and SB. The CF group has the best corrosion resistance followed by the EDM, MIL, and SB groups.

**Keywords:** Co-Cr alloy, corrosion, profilometry, SEM/EDX, surface roughness