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Microstructure and mechanical properties of new Ni-Cr and Co-Cr dental alloys

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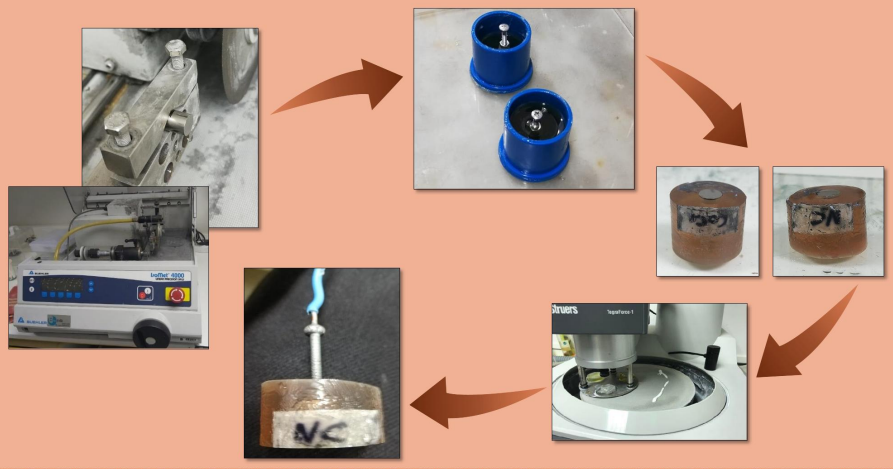
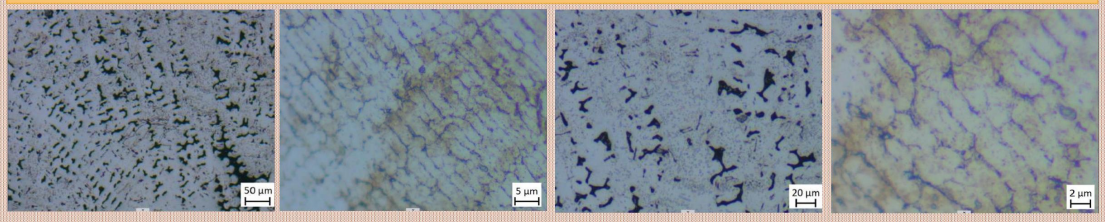
SAMPLES PREPARATION



Composition (in wt.%)	Specimens	
	Ni-Cr	Co-Cr
Ni	65.6	-
Co	-	59.5
Cr	20.1	31.5
Mo	1.3	5.0
Al	2.4	-
Si	3.3	2.0
W	7.1	-

MICROSTRUCTURAL CHARACTERIZATION

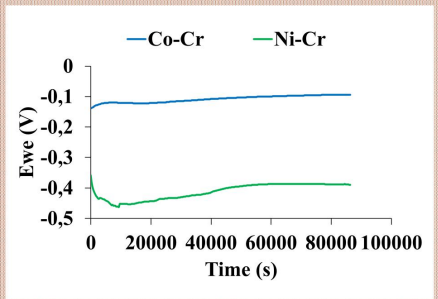
Ni-Cr | Co-Cr



THREE-POINT BENDING TEST

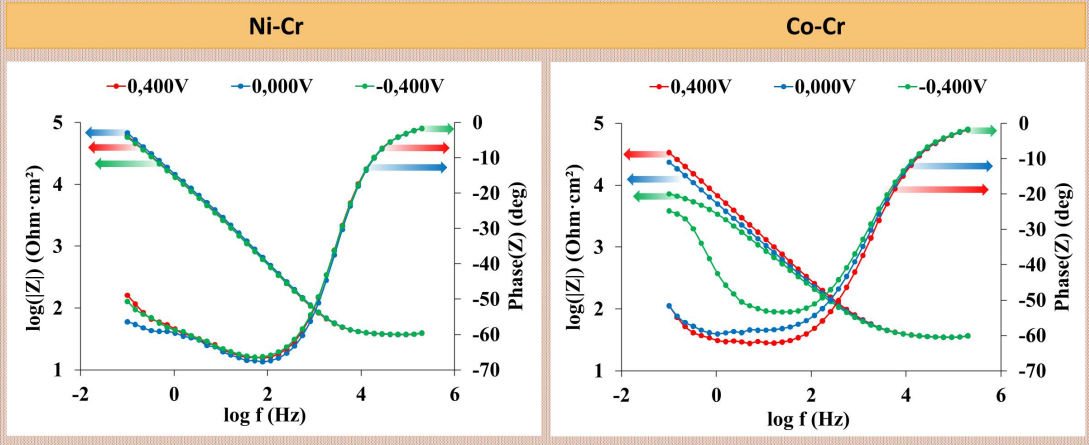
Sample	Average E (GPa)
NiCr	129 ± 24
CoCr	111 ± 11

CORROSION POTENTIAL



ELECTROCHEMICAL IMPEDANCE SPECTROSCOPY

Ni-Cr | Co-Cr



CONCLUSIONS

- The metallography test revealed that both samples have a dendritic structure, despite certain flaws.
- In corrosion potential graphs, the samples tend to passivate but not stabilize, thus this test should be repeated over time to determine if a stable potential is established. The greater the result of the impedance value, the stronger the corrosion resistance, according to the Electrochemical Impedance Spectroscopy (EIS) technique and Bode impedance graphs. As a result, the Co-Cr alloy has stronger corrosion resistance than Ni-Cr alloy due to it has a higher impedance value and a higher positive corrosion potential.
- The Co-Cr alloy had a lower modulus of elasticity in the three-point bending test, although the results of both samples were widely spread.

Nonetheless, no apparent association between the degree of molybdenum and silicon concentrations in the alloys and the electrochemical corrosion behavior has been established.