

8 Summary

In developing new alloys it is necessary to ensure that the mechanical and physical qualities satisfy the high demands which are needed for the oral cavity.

The aim of the present study was to investigate and compare the mechanical properties of newcast and recast gold titanium alloys before and after simulated, dental ceramic firing. In addition the influence on the hardness and metallic structure was examined.

Eight series of test specimens were designed to establish how the mechanical properties of alloys are affected by processing in commercial working dental laboratories.

The following gold titanium alloys were tested: Biotrend 210 (Wieland company), BiOr 17 (Degussa company) and Esteticor Vision (Cendres & Métaux company). As a reference alloy the high-gold-content alloy Porta P6 (Wieland company) was tested.

The measurement of the elastic and plastic qualities of the alloys was carried out by tension testing in accordance with DIN EN 10002 - 1 [12]. For 24 series the 0,2 % yield strength was measured, with 8 samples in each series. With each alloy, a measurement series was made using 100 % new metall and 66 % new metall with 34 % recast metall, before and after simulated ceramic firing. In each series 1-2 samples were additionally tested microscopically and the Vickers surface hardness was determined.

The results reveal that the examined gold titanium alloys exhibit comparable hardness values, to clinical approved high gold content alloys.

The measured values of the 0,2% yield strength for the gold-titanium alloys prove sufficient values. They are however significantly below the values for the reference alloy.

The various series of the gold-titanium-alloy of 100% new metall do not differ significantly from one another.

The treating of the alloys in commercial working dental laboratories does not lead to a strong change or reduction of the measured parameters.

The recasting of the gold-titanium alloys with 66% new metall shows scattering of values in the tension test and in the hardness tests.

After the dental ceramic firing, with exception of the alloy Biotrend 210, the values of the gold-titanium alloys reveal only a slight increase in 0,2% yield strength and Vickers hardness, in comparison to the more strongly increased measured values of the reference alloy Porta P6.

The low increase of the hardness is partly to be explained by the values scattering downwards due to inhomogeneities in the structure.

The microscopic pictures reveal a mainly homogeneous structure in the gold-titanium alloys, but with still many more inhomogeneities in structure than the reference alloy. In some samples from the series with 66 % new metall, precipitations of titanium were found deposited like little crystallites within the gold titanium phase.