

05/13

Mechanically alloyed Ag based alloys for dental restorations

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Silver, tin and copper based alloys were mechanically alloyed in a vibratory Spex 8000 or a Zoz CM-01 mill. Two powder compositions, Ag₄₅ - Sn₃₁ - Cu₂₄ and Ag₅₀ - Sn₃₀ - Cu₂₀ (%w), were milled under argon atmosphere, from 30 minutes up to 8 hours. Milling products were Ag₄Sn, Cu₆Sn₅ and Cu₃Sn, according to analysis by X-ray diffraction. The products were heat treated at 453 K (180 °C) during 1 hour before the trituration (amalgamation) step. The amalgamation required an amount of mercury up to 2-fold the commercial amount, even though similar products were obtained (Ag₂Hg₃ and Cu₆Sn₅). Preliminary tests indicated that these products are not suitable for use as dental restorations.