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Colored gold alloys by mechanical alloying

Leal Neto, R. M (1); Guilherme, E. G. (1)

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This paper reports on an investigation of the production of colored gold alloys by mechanical means performed in a high-energy ball mill. Starting from powder particles of each alloy element, mixed at the appropriate proportion, 18-carat gold alloys of conventional colors (i.e. yellow, red, white) and non-conventional ones (i.e. purple, blue, green, black) were produced. Conventional colored alloys come from Au-Ag-Cu system and are obtained with different mass proportion of these elements. For white gold a bleaching element such as Ni is added. Purple gold results from alloying with aluminum in order to form AuAl₂ intermetallic compound. The other non-conventional colors are obtained after oxidation of the alloys made with Fe and Co by heat treatment in air. Mechanical alloyed powders can be also compacted and sintered. Microstructural characterization and color measurement results are presented along with examples of jewelry made from powder and sintered parts.