

## On the microhardness of the composite Ga-Cu-Sn obtained multivibration the processing idkategorori mixture

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### Abstract

Synthesis of the gallium-based metallic pastes can be realized as usual by intensive mechanical mixing of solid and liquid components. “Classic” material of the powder part is  $\text{Cu}_3\text{Sn}$  intermetallide (ordinary used as spherical particles of small size fractions). The liquid part – as a rule – is eutectic Ga-Sn alloy (containing 13.6 wt.% Sn, Ga – the rest. Vibrational impact onto the capsule with the initial powder mix leads to the formation of paste. This paste solidifies during the components diffusion process (as a rule, in a few minutes) and reaches maximum strength in about 24 hours of the room temperature exposition. Here, a new modification of such “classic” method of gallium composite formation is described. The possibility of obtaining and synthesizing the composite material of the GA-Cu-Sn system by a new multi-vibration method of processing a mixture of the original solid and liquid components, combining in one process a low-frequency action with a frequency of 50 Hz and an amplitude of 15 mm and an electric pulse with a pulse frequency of 1000 Hz, a pulse duration of no more than 10<sup>-9</sup> s and a single pulse power of 1 MW. The microhardness of the components of the resulting composite alloy consisting of  $\text{Cu}_3\text{Sn}$  particles in the shell of a solid  $\text{CuGa}_2$  intermetallic compound and a binding matrix of a solid GA-Sn solution with embedded  $\text{CuGa}_2$  particles is determined. The values of microhardness of composite samples created using new multi-vibration and conventional low-frequency methods of processing the initial mixture were compared. It was found that the microhardness of components designed to withstand mechanical stress as a result of multivibration treatment is higher than after low-frequency exposure for the same period of time. The conclusion about expediency of use of a new method at creation of composites of GA-Cu-SN system is drawn.

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