Effect of Germanium on Secondary Lead-free Tin Solders

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The paper deals with the lead-free soldering and influence of germanium amount in lead-free secondary solder Sn99. Lead-free soldering is an emerging area in the metallurgy of non-ferrous metals with a non-harmful effect on the environment. This method of soldering is very important for connecting materials in precision electrical engineering. In the experimental part of the paper are evaluated properties of lead-free solder Sn99 with graduated amount of Ge, compared with lead-free solder with the addition of nickel and silver. The goal was to provide knowledge on the impact of germanium on microstructure change, solderability and formation of oxides on the surface. From the results it can be concluded that germanium in lead-free solders reduces the formation of oxides on the surface by the addition of 0.01 wt. % Ge to the batch. With the amount of 0.01 wt. % also the grain is refined in the microstructure, resulting in improved castability. In terms of solderability experiments confirmed that germanium improves the flowability of solder on the PCB substrate.

Keywords: secondary lead-free solder, Sn99, Ge, soft solders

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