

THE POSSIBILITY OF MODIFICATION OF SILUMIN BY AN ELECTRON BEAM

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In the paper hypereutectic cast silumin (22-24wt.%) was used. The primary structure was characterized by presence of intermetallides and primary silicon inclusions, pits and pores. Their size is hundreds of micrometers. Sum up this facts, It does not allow the use of material for the manufacture of machine parts.

The aim of the work is to modify the structure and properties of the hypereutectic silumin samples by a pulsed electron beam irradiation.

The irradiation was carried out by an intense pulsed electron beam of a submillisecond exposure time (setup "SOLO" (IHCE SB RAS)) [1-3]. The structure was studied by optical and scanning electron microscopy, X-ray phase analysis. The mechanical properties were characterized by the value of microhardness (PMT-3 device). The wear resistance studies of silumin were determined under conditions of dry friction in the disk-pin geometry at room temperature in a TRIBOtechnik installation.

It was established that multiphase structure of the submicron-range was formed. The structure's thickness is up to 70 microns. It is happened as the result of high-speed melting and subsequent crystallization. Optimal irradiation mode is 18 keV, the energy density of the electron beam was 30-35 J/cm², the pulse repetition rate was 0.3 s⁻¹, the pulse duration was 200 μs and the number of pulses was 20.

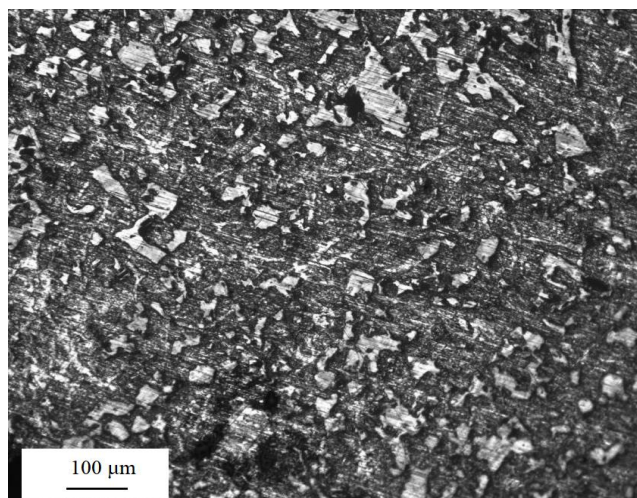


Figure 1. The structure of cast hypereutectic silumin

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References

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