

Gas Reagents Refining of Aluminum Based Alloys

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THESIS

Explanatory note to the bachelor research project. 93 pages, 30 figures, 15 tables, 1 annex, 29 sources.

Research object: aluminum alloys, refinement of alloys using gas-reagent environment.

Objective: to perform theoretical and experimental studies of hydro- and aerodynamic processes, heat and mass transfer, physical and chemical processes in melts during their reaction with plasm environment.

Research methods and techniques: the structures were studied using optical metallography (with microscope MIM-7 and NEOPHOT-4 having magnification in the range of 100...400 times), chemical and differential thermal analysis; gas concentration in the casting metal was determined by vacuum melting, in the molten metal – by hydrogen extraction method through the palladium filter; mechanical tests were performed on tension test machine FP 100/1.

It was determined that decrease in the size of melted microgroups by 2–2.5 times increases tension strength of cast metal by 25–30%, length – by 1.7–1.8 times; in the reaction zone of sunk plasma jet the temperature of metal is by 400–600 K higher (during the cold gas blowing – by 150 K lower) than average temperature of melted aluminum. During the cooling of heated plasm gas down to average temperature the bubble sizes decrease by 25–40%. As a result the time of renewal of the boundary layer on the heated gas bubbles compared to the cold is reduced by 2 or more times.

The results can be recommended for use in developing the technologies of aluminum alloys plasm melting using gas-reagent environment.

TEMPERATURE OF PLASMA, ALUMINUM, METAL OVEN,
DURABILITY, MASS TRANSFER, NON-METALLIC INCLUSIONS.