

## Investigation of the effect of processing nanodispersed powder materials on the microstructure and corrosion resistance of magnesium alloy ML5if

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### Abstract

In the present study we investigated the effect of treatment of magnesium alloy ML5if of modification mixture of ZrO<sub>2</sub> dispersed particles and cryolite. The object of investigation is magnesium alloy ML5if, which found wide application in shipbuilding. As a result of studies found that magnesium alloy ML5if treated by modification mixture has a reduced grain size of the metal matrix and causes a change in the mechanism of phases formation, whereby observed formation of Zr<sub>3</sub>Zn<sub>2</sub> Zr<sub>2</sub>Al phases and at the interface of the metal grains. Changing the phase composition and grain size of the metal increases the corrosion resistance of the alloy in an aqueous solution of NaCl.

### References

- [1] I.S. Kornysheva, E.F. Volkova, E.S. Goncharenko, I.Yu. Mukhina. Application Perspectives of Magnesium and Casting Aluminium Alloys. *Aviacionnie Materiali i Tehnologii. M.: VIAM*. **2012**. P.212-222. (russian)
- [2] E.F. Volkova, I.V. Iskhodzhanova, L.V. Tarasenko. Structural changes in magnesium alloy MA14 under the action of process factors. *Metallovedenie i Termicheskaya Obrabotka Metallov. M.: LLC «Folium»*. **2010**. No.12. P.19-23. (russian)
- [3] E.F. Volkova, G.I. Morozova. Structure and properties of Zr-containing magnesium alloy MA14. *Metallovedenie I Termicheskaya Obrabotka Metallov. M.: LLC «Folium»*. **2006**. No.1. P.24-28. (russian)
- [4] G.I. Morozova. Phase composition and corrosive resistance of magnesium alloys. *Metallovedenie I Termicheskaya Obrabotka Metallov. M.: LLC «Folium»*. **2008**. No.3. P.8-12. (russian)
- [5] G.V. Lyamina, A.E. Ilela, A.A. Kachaev, D. Amantai, P.V. Kolosov, M.Yu. Cheprasova. Nanopowders of aluminum oxide and zirconium from solutions of their salts by spray drying. *Butlerov Communications*. **2011**. Vol.33. No.2. P.119-124. ROI: jbc-02/11-33-2-119
- [6] G.V. Lyamina, A.E. Ilela, E.S. Dvilis, I.A. Bozhko, A.P. Gerdt. Synthesis of nanoscale aluminum and zirconium oxides from aqueous and aqueous-alcoholic solutions with polyethylene glycol. *Butlerov Communications*. **2013**. Vol.33. No.3. P.55-62. ROI: jbc-02/13-33-3-55
- [7] A.P. Zykova, D.V. Lychagin, A.V. Chumaevskii, I.A. Kurzina, M.Yu. Novomeiskii. Influence of modifying of cast iron SCH25 (Russian grade) with ultrafine powders of refractory metal oxide and cryolite on structure, mechanical properties and fracture. *Izvestiya VUZov. Chernaya Metallurgiya*. **2014**. Vol.57. No.11. P.37-42. (russian)
- [8] E.F. Volkova, L.V. Zaslavskaya, F.L. Gurevich. The main directions of development of wrought magnesium alloys. *Metallurgy, Casting and Machining of Magnesium Alloys. M: VILS*. **1995**. P.106-112. (russian)
- [9] A.V. Koltigin. Enhancement of Mg Alloys' Oxidation Resistance with Small Calcium Additions. *Liteinoe proizvodstvo. LLC «Liteinoe proizvodstvo»*. **2012**. No.2. P.10-13. (russian)