

# Influence of Extreme Thermobaric Impacts on the Structure and Properties of the Al-TM-REM Glassforming Alloys

**Menshikova S G**

Udmurt Federal Research Center of the Ural Branch of the Russian Academy of Sciences, Tatiana Baramzina Street 34, Izhevsk, Udmurt Republic 426067, Russia

svetlmensh@udman.ru

Progress in understanding the processes of structure formation occurring in melts of the Al-TM-REM type (TM-transition metal, REM-rare earth metal) in the field of eutectics, as well as in studying the influence of extreme effects (high pressures, temperatures and cooling rates) on their processes hardening has a high scientific significance and relevance. The structure and properties of aluminum-based alloys of binary Al-REM and multicomponent Al-TM-REM glass-forming alloys and high-entropy AlNiCoFeCr alloys are studied during the rapid solidification of their high-temperature melts in a toroid-type high-pressure chamber. The possibility of forming a new phases in alloys is investigated. The temperature range is from liquidus to 2000 K. The pressure range is from atmospheric to 10 GPa. The cooling rate is 1000 deg/s. At pressures above 7 GPa and temperatures of the order of 1800 K, new metastable compounds are formed in the alloys, which persist for a long time under normal conditions. Depending on the production mode, the mechanisms of melt solidification change, and abnormally supersaturated solid solutions are formed in the alloys. The samples are homogeneous, dense, no pores and shrinkage cavities were found. The structure is finely dispersed with high mechanical properties. High pressure increases the glass-forming ability of the alloys.

The study was supported by the Russian Science Foundation (Grant No. 22-22-00674).