ligh Pressures on the Solidification
l$_{86}$Ni$_6$Co$_4$Gd$_2$Tb$_2$ Liquid Alloy

kova[a, b, *], V. V. Brazhkin[c], and A. S. Danilova[b]
Ural Branch of the Russian Academy of Sciences, Izhevsk, 426067 Russia
ıurt State University, Izhevsk, 426034 Russia
re Physics Russian Academy of Sciences, Moscow, 108840 Russia
*e-mail: svetlmensh@udman.ru

l, 2021; revised December 9, 2021; accepted December 9, 2021

ork is the study the possibility of the formation of new phases in the
d solidification of its high-temperature melt under high pressure. Samples
igh pressures of 3, 5 and 7 GPa in a high-pressure chamber of the "toroid"
ıard alloy anvils pressed into steel rings. Alget stone was used as a pressure-
l melting of the sample was carried out by passing an alternating current
xagonal boron nitride crucible. High pressure punches served as current
calculated on the basis of the thyristor readings, according to the current
carried out at a rate of 1000 deg/sec, the temperature of the melt before
ıtal scheme: pressure setting → pulse heating → holding at a set pressure
ut depressurization to room temperature → high pressure reduction to
f the samples of the alloy of the eutectic composition $Al_{86}Ni_6Co_4Gd_2Tb_2$,
ıing temperature (1500°C) and high pressure (3, 5 and 7 GPa), has been
-ray diffraction analysis, optical and electron microscopy. Cooling rate
tion of a high solidification rate and mechanical compaction under high
e composition $Al_{86}Ni_6Co_4Gd_2Tb_2$ with a fine structure and high density
GPa, the formation of new phases was noted in the alloy: Al_3(Gd/Tb)* (of
ube structure (cP4/2) with a lattice parameter $a = 4.285 \pm 0.002$ Å and
type) with a tetragonal structure (tI26/1) with parameters $a = -8.906 \pm$
Studies have shown that the average microhardness of a sample obtained,
GPa, is high (~1700 MPa) due to solid solution and precipitation harden-
an in the original sample. The results obtained show the fundamental pos-
dification of the melt under high pressure to change the level of properties
y without changing their chemical composition by modifying the structure
he structural components of the sample.

nelt, high pressure, microstructure, cooling, microhardness, high resolu-

)

N

to the develop-
ıminum matrix
ia and abroad,
these materials,
tance, plasticity,
ınd the possibil-

ıaterials can be
ıditions far from
extreme actions
ıenching of the
), self-propagat-

ing high-temperature synthesis under various conditions, high pressures (~10 GPa and higher) (including an intense plastic deformation), superhigh and superlow temperatures, high and ultrahigh electric and magnetic fields.

The Al–TM–REM alloys (TM are transition metals, REM are rare-earth metals) containing 80–90 at % Al, in particular, eutectic Al(Ni,CO)-REM alloys are quite easily amorphized by the spinning method at superfast quenching from a liquid phase [3]. However, a small thickness of the amorphous ribbons (~20–40 μm) substantially restricts their application. The problem of increasing their thickness is topical by