ALUMINIUM BASE AMORPHOUS AND CRYSTALLINE ALLOYS WITH Fe IMPURITY

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Aluminium base alloys show remarkable mechanical properties, however their low thermal stability still limits the technological applications. Further improvement of mechanical properties can be reached by partial crystallization of amorphous alloys, which gives rise to nanostructured composites.

Our work was focused on aluminium based alloys with Fe, Nb and V additions. Samples of nominal composition $Al_{90}Fe_7Nb_3$ and $Al_{94}Fe_2V_4$ were studied in amorphous state and after annealing up to 873 K. From Mössbauer spectra taken on the samples in amorphous state the value of f-factor was determined as well as corresponding Debye temperatures were calculated. Annealing at higher temperatures induced nano and microcrystalline crystallization. Mössbauer spectra of samples annealed up to 573 K are fitted only by distribution of quadrupole doublets corresponding to the amorphous state. An increase of annealing temperature leads to the structural transformation, which consists in growth of nanometer sized aluminium nuclei. This is partly reflected in Mössbauer parameters. After annealing at 673 K intermetallic phase Al_3Fe and other Al-Fe phases are created. In this case Mössbauer spectra are fitted by quadrupole doublets. During annealing up to 873 K large grains of Fe-Al phases are created.