# SOLID-PHASE REACTIONS IN THE $Mo_{80}Fe_{20}$ SYSTEM DURING MECHANICAL ALLOYING

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At present vast amount of information concerning evolution of metallic systems during mechanical alloying is available. Fe-based systems are most thoroughly studied due to the great practical importance. As it follows from published sources Fe-Mo systems were investigated by several workgroups, with Mo concentration ranging from 0 to 50%. However there were not found any papers where solid-state reactions in Fe-Mo alloys with Mo concentration exceeding 50% were described in details.

$Mo_{80}Fe_{20}$ (in atomic ratio) sample was chosen for the study. Mechanical alloying is carried out by laboratory ball mill Pulverizette 7 in Ar atmosphere. The vials and the balls were made of SHKh-15 bearing steel. Sample load weight was 10g. Powder contamination was controlled before and after mechanical alloying. The milling time ranged from 0.5 up to 24h.

The Mössbauer spectroscopy was performed on SM2201DR spectrometer. For the X-ray analysis DRON-3 diffractometer with Cu Ka filtered rays was used.

At the early stage of mechanical alloying the metastable $Mo_{63}Fe_{37}$ HCP-phase was formed. The formation of hcp-phase probable is due to minor quantity (1.5-2 at.%) $MoO_3$ phase in the initial Mo powder. Solid-state reactions took place only when the system had become nanocrystalline. The supersaturated solid solution Mo(Fe) with 20 at.% Fe (milled for 24h) was obtained. Two stages of mechanical alloying were observed: Mo+Fe→ bcc Mo-Fe + hcp Mo-Fe and Mo-Fe + hcp Mo-Fe → bcc Mo-Fe + Am Mo-Fe.

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