Structural Investigation of Mechanically Alloyed Co-Fe-Ta-B-Mo Alloy

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Abstract. Mechanical alloying (MA) is a very versatile process for preparation of various types of metastable and nanostructured materials. Recently we demonstrated that fully amorphous material can be prepared by wet mechanical alloying of Co-Fe-Ta-B powder mixture. The aim of this work is to investigate influence of small addition of Mo on structure of wet mechanically alloyed $Co_{52.5}Fe_{10}Ta_{5.5}B_{30}Mo_2$ (at. %). Changes in local atomic structure at various stages of milling were investigated by high-energy X-ray scattering (HEXS) using synchrotron radiation. Thermal stability and phase transformations were studied by means of high-temperature (up to 800 °C) in-situ HEXS experiments. Structural investigations confirmed that 100 hours of wet mechanical alloying in hexane results in formation of nanocomposite Co-Fe-Ta-B-Mo powder alloy characterized with presence of a small fraction of nanocrystalline phase/s evenly distributed within the major amorphous phase. High-temperature in-situ HEXS experiments provided valuable information about transition temperatures and phases which are formed during thermal loading.