# Self-Assembly in Metallic Alloys

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Self-assembly is a process in which the structure organization shows autonomous character and some interesting phenomena revealed in this process attracted the attention of researchers. Self-assembly, as the spontaneous organization of parts into larger structures via energy minimization, is related both with fundamental and practical application importance. It is clear that transition from parts to a more complex structure is accompanied by the structure changes.

In this work, we present the results of the study of the structure evolution in amorphous metallic alloys after laser irradiation of their surface. Amorphous metallic alloys have been obtained by means of rapid cooling from the liquid state. It was shown that atomic distribution in the amorphous state is in topological and chemical respects similar to one of the melt before solidification. Both states show the short range order with some definite values of main structure parameters (most probably interatomic distance and number of neighbor atoms). Upon laser irradiation, the transition from amorphous state to liquid one and then from liquid to amorphous or nanocrystalline occurs. Upon liquid-amorphous (nanocrystalline) transition we have observed the formation of laser stimulated periodic structures on the surface of metallic alloys, due to which most of the physical properties, first of all magnetic, have been significantly improved. X-ray diffraction data were used to calculate the thermodynamic data, related to self-assembly process. Particularly, we have calculated configurational entropy of mixing from experimental structure factors, and its change was used to analyze the self-organization in amorphous metallic alloys upon laser irradiation.