The development of the aerospace and automotive industry leads to extensive studies on new materials capable to meet the growing requirements for increased thermo-mechanical properties while maintaining low density. Therefore, new materials are being developed that could compete with those currently used on the market.

The currently used strengthening methods focus on the following areas: nanostructure formation through precipitation hardening induced by combination of appropriate heat treatment and aging, intense deformation or rapid solidification. A relatively new area is focused on the idea to strength aluminum alloys by producing non-periodic structures in their microstructure: amorphous or quasi-crystalline. In the 1990s it was discovered that the formation of the quasicrystalline phase in aluminum alloys results in a significant increase in the hardness and tensile strength of the obtained samples. This applies to alloys in which the microstructure consisted of quasi-crystalline nanoparticles dispersed uniformly in an aluminum matrix. Unfortunately, this microstructure can be obtained only by rapid solidification, which limits one of the sample dimensions to several dozen of micrometers. The production of larger materials such as sheets would require another method of production with could provide a similar microstructure. For example conventional methods of manufacturing light alloy products including casting coupled with rolling and aging. Such procedure can result in the formation of nanocrystalline nanoparticles for some metals. Currently known and used (for surgical instruments) are iron alloys reinforced with the quasi-crystalline phase produced by the aging process. The latest literature reports indicate that the formation of such precipitates in the aging process of aluminum alloys is also possible. Formation of nanoprecipitates of the quasi-crystalline phase in the alloy microstructure or its close approximant (i.e. crystalline phase similar to quasicrystal in terms of structure and chemical composition) can be initiated by introducing a small addition of silver to the alloys containing Mg, Zn and Cu or by applying appropriate thermo-mechanical treatment. For these materials an increase in mechanical properties was observed compared to commercial alloys. Therefore, the study of the influence of various factors on the formation of precipitation with quasicrystalline structure in aged aluminum alloys is a novel direction which may lead to the development of new high-strength aluminum alloys in the future.