

Poster Presentation

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Synthesis and thermal stability of Au-based quasicrystals and its approximants

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Various Tsai-type quasicrystals and crystalline approximants have been found in a variety of systems. These compounds are made of Tsai-type icosahedral clusters. Recently, the existence of long-range magnetic orders was reported in Cd₆R and Au-SM-R approximants[1,2]. Therefore, it is of interest to investigate the magnetic properties of new alloys systems which are also composed of Tsai-type clusters. In the present work, in order to search new Tsai-type quasicrystals as well as approximants, we have investigated the phase constitution and phase stability in the Au-In-R(R=rare-earth) systems. In this research, alloys of various compositions were prepared by arc melting and were subsequently annealed under various conditions. The phase constitution and phase stability were investigated by X-ray diffraction and differential thermal analysis. As a result, we have observed the formation of 1/1 approximants in the Au-In-R systems and found that they are stable up to high temperatures of ~1000K. The formation condition and stability of icosahedral quasicrystals will be also reported in the presentation.

[1] R.Tamura, Y.Muro, T.Hiroto, K.Nishioto, T.Takabatake, *Physical Review B*, 2010, 85.13, [2] T.Hiroto, G.H.Gebresenbut, C.P.Gomez, et al. *Journal of Physics: Condensed Matter*, 2013, 25.42, 1-6.

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