CRYSTALLIZATION PROCESSES IN AMORPHOUS $Y_xCe_{50-x}Cu_{42}Al_8$ (x = 0, 25) ALLOYS

B. Mielniczuk, Z. Śniadecki, B. Idzikowski
Institute of Molecular Physics, Polish Academy of Sciences,
M. Smoluchowslkiego 17, 60-179 Poznań, Poland

Not only in a selected crystalline compounds but also in amorphous and nanocrystalline metals the heavy-fermion (HF) behavior was found. This effect could be strongly enhanced by topological disorder, lattice defects or granular structure. The influence of structural disorder and interaction between electrons can be successfully studied as a function of number and size of nanocrystalline grains embedded in an amorphous matrix. The best suited for such investigation can be cerium-based alloys because of unstable valence character of Ce atoms that is a prerequisite for the occurrence of strongly correlated electron phenomena.

Ribbons of amorphous $Y_xCe_{50-x}Cu_{42}Al_8$ were produced by one wheel melt-spinning method. Obtained materials were studied by X-ray diffractometry (XRD) and differential scanning calorimetry (DSC) with different heating rates from 10 to 50 K/min. There are two stages of crystallization observed in both samples, but in $Y_{50}Cu_{42}Al_8$ second peak is not significant and it is not visible at high heating rates. Characteristic temperatures and enthalpies of crystallization process were determined. Effective activation energies were calculated from the Kissinger relation and are equal 247±18 kJ/mol and 569±107 kJ/mol for $Y_{25}Ce_{25}Cu_{42}Al_8$ and $Y_{50}Cu_{42}Al_8$, respectively.