Effect of Cr and Ni addition on the Al-Cu-Fe QC phase formation

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Quasicrystals (QC´s) exhibit particular features when compared to conventional crystalline solid materials. They present an aperiodic, however, highly ordered atomic structure. These phases exhibit a variety of interesting properties for application as protective coatings, including high hardness, low friction coefficient, high corrosion resistance in acid medium, high resistance to oxidation and low thermal conductivity. In the present work, the phase formation on alloys of the following systems was analysed: Al-Cu-Fe, Al-Cu-Fe-Cr and Al-Cu-Fe-Ni. The alloys were fabricated by arc-melting and *melt-spinning* and were characterized by transmission and scanning electron microscopy (TEM and SEM) and by X ray diffraction (XRD). The choice of the alloys composition was based on literature and on the Hume-Rothery rule adapted for quasicrystalline phases. Addition of Cr on the ternary Al-Cu-Fe transformed the icosahedral QC to a decagonal QC gradually with the increase of Cr content. On the other hand, Ni addition changed drastically the phase constitution and it was found that the solubility of Ni on the icosahedral phase was lower than 4 at.%.