

The $\text{Al}_{65}\text{Co}_{20}\text{Cu}_{15}$ alloy, in which quasicrystalline decagonal phase is formed, is less corroded in all the investigated acidic solutions, compared to the $\text{Al}_{63}\text{Cu}_{25}\text{Fe}_{12}$ alloy. The specimens' mass gradually increases in the solutions of chloric and nitric acids, especially in the HCl solution. After staying in the solutions of sulphuric and orthophosphoric acids, the specimens' mass, on the contrary, decreases, in the H_3PO_4 solution to a greater extent. The alloy surface exposed to acids rather homogeneously dissolves except for areas where boundaries of crystalline $\text{Al}_3(\text{Cu},\text{Co})_2$ phase are located which corrode at a higher rate. Compared to $\text{Al}_{63}\text{Cu}_{25}\text{Fe}_{12}$ alloy, corrosion propagation of $\text{Al}_{65}\text{Co}_{20}\text{Cu}_{15}$ alloy is more uniform.

The studies on the behavior of the investigated alloys in the acidic media (pH=1.0) reveal the most severe corrosion of iron-rich phases in the structure of the $\text{Al}_{63}\text{Cu}_{25}\text{Fe}_{12}$ alloy or cobalt-poor phases in the structure of the $\text{Al}_{65}\text{Co}_{20}\text{Cu}_{15}$ alloy. Therefore, the decagonal quasicrystalline phase of the $\text{Al}_{65}\text{Co}_{20}\text{Cu}_{15}$ alloy which contains cobalt exhibits enhanced corrosion resistance compared to the icosahedral quasicrystalline phase of the $\text{Al}_{63}\text{Cu}_{25}\text{Fe}_{12}$ alloy which contains iron. The $\text{Al}_{65}\text{Co}_{20}\text{Cu}_{15}$ alloy may be used as coatings for effectively improving corrosion resistance since this alloy behaves relatively inert in the acids compared to the $\text{Al}_{63}\text{Cu}_{25}\text{Fe}_{12}$ alloy.

References

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