ABSTRACT

METHOD OF LASER CASTING COPPER-BASED COMPOSITES

This invention presents the process of direct laser casting of copper alloys: Cu-X (where X = Ni, Fe, W;) and their composites Cu-Y and Cu-X-Y (Y=WC, TiC, Ti+C) from powders prepared using mechanical mixing and ball milling processes. Since the metallic powder is combined with a low melting point Cu metal, which has good thermal and electrical conductivity, the combination allows the powder mixture to be melted by CO_2 laser and re-solidified into a part with good mechanical properties and conductivity. The laser casting process for the Cu-based in-situ formation and the material systems formed using the said method have been developed. The process can be used to fabricate complex three-dimensional objects by multi-layer overlapping and the material systems can be used to build rapid tooling due to the properties of good thermal conductivity and low wear rate.

(Figure 1 is to be published.)