Accepted Manuscript

Properties and microstructure changes in Au-Cu-based alloy with indium addition

Junkai Zhang, Ying Li, Qin Zhang

PII: S0925-8388(17)33764-7

DOI: 10.1016/j.jallcom.2017.11.018

Reference: JALCOM 43711

To appear in: *Journal of Alloys and Compounds*

Received Date: 23 May 2017

Revised Date: 30 October 2017

Accepted Date: 3 November 2017

Please cite this article as: J. Zhang, Y. Li, Q. Zhang, Properties and microstructure changes in Au-Cu-based alloy with indium addition, *Journal of Alloys and Compounds* (2017), doi: 10.1016/j.jallcom.2017.11.018.

Properties and microstructure changes in Au-Cu-based alloy with indium addition

Junkai Zhang[1,2], Ying Li[1,2*], Qin Zhang[1]
1 School of Metallurgy, Northeastern University, Shenyang 110819, China
2 Liaoning Key Laboratory for Metallurgical Sensor and Technology, Shenyang 110819, China

Abstract

In this work, the effects of indium addition on the microstructure, corrosion resistance and hardness in as-cast Au-Cu-based alloys were investigated. The experimental results indicated that as-cast Au-Cu-based shown a typical dendritic structure, and the secondary dendrite arm spacing of alloy was significantly decreased by adding indium element, especially when the In-rich phase existed at interdendritic region. The as-cast samples without indium and with 1 wt.% In were a single Au-Cu-based solid solution with face-centered cubic (f.c.c.) structure. Moreover, the In-rich phase of the alloy with 3 wt.% In shown granular structure, but with 5 wt.% In was network structure. With the indium content increasing, the hardness of alloy was significantly increased and exhibited better Hall-Petch type relationship with the secondary dendrite arm spacing. Minor indium addition enhanced the corrosion resistance of alloy, but when an In-rich phase generated at interdendritic region, the corrosion rate was increased due to the micro-galvanic effect and also affected by the structure of the In-rich phase.

Keywords

Au-Cu-based alloy; Indium addition; Precipitated phase; Corrosion resistance; Hardness

1. Introduction

Gold and its alloys are widely used due to their high electric conductivity, stable contact resistance, excellent corrosion resistance and fascinating color. For example, starting from the early human civilization, large amounts of gold have been used for decoration and jewelry because of their unique colors [1]. Meanwhile, gold is a suitable electrical contact material for electrical connectors using in aviation and aerospace engineering, which can well lower the fretting corrosion and not oxidize in air [2,3]. Gold is also an excellent dental material due to high corrosion resistance

* Corresponding author.
E-mail address: liying381@126.com, liying@smm.neu.edu.cn (Y. Li).