

Research on multi functional Cu-Cr-Zr alloys in mechanical and electrical properties produced by controlling its nano-structure

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2004 Fiscal Year Final Research Report Summary

Research on multi functional Cu-Cr-Zr alloys in mechanical and electrical properties produced by controlling its nano-structure

Research Project

Project/Area Number

15560604

Research Category

Grant-in-Aid for Scientific Research (C)

Allocation Type

Single-year Grants

Section

一般

Research Field

Structural/Functional materials

Research Institution

Kanazawa University

Principal Investigator

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Project Period (FY)

2003 – 2004

Keywords

ultrafine grain / ECAP process / Cu-Cr-Zr alloy / mechanical property / electrical property / multi function / thermal stability

Research Abstract

This research has been conducted to produce the excellent Cu alloy in combination with good electrical conductivity and mechanical properties by controlling its nano-structure.

1.The ultrafine grain (UFG) Cu-Cr and Cu-Cr-Zr dilute alloys with different concentrations of alloying elements have been fabricated by ECAP (Equal Channel Angular Pressing), and followed by heat treatment.

(1)The post ECAP aging makes the precipitation hardened ultrafine grain structure rather stable under both thermal and mechanical influence.

(2)Optimal aging conditions are found to ensure the best high cycle fatigue performance in combination with good electric conductivity, strength and

ductility.

(3)The significant improvement of tensile and HFC properties observed together with improvement in ductility if compared to ordinal Cu-Cr-Zr alloys fabricated by cold working and heat treatment.

2.The ultra fine grain Cu-0.36Cr alloy was fabricated by multiple ECAP with different strain path, aiming at fabrication of UFO structures with different structures.

(1)ECAP has been capable of producing high strength UFG materials having a considerable amount of uniform deformation.

(2)The tensile strength and high cycle fatigue properties are just slightly affected by the strain path, grain shape and crystallographic texture of ECAP specimens.

3.The fracture and fatigue resistance of ultrafine grain Cu-Cr-Zr alloy produced by ECAP was investigated.

(1)The fatigue crack growth behavior is independent of the specimen orientation, proving the ECAP create a uniform structure with rather isotropic properties.

Research Products (6 results)

All 2005 2004 Other

All Journal Article (6 results)

- [Journal Article] Effect of strain path on structure and mechanical behavior of ultra-fine grain Cu-Cr alloy produced by equal-channel angular pressing 2005 ▾
- [Journal Article] Effect of Chemical Composition on Structure and Properties of Ultrafine Grained Cu-Cr-Zr Alloys 2004 ▾
- [Journal Article] ECAP加工したCu-0.36Cr合金の微視組織と低サイクル疲労特性 2004 ▾
- [Journal Article] Effect of Chemical Composition on Structure and Properties of Ultrafine Grained Cu-Cr-Zr Alloys 2004 ▾
- [Journal Article] 「研究成果報告書概要(欧文)」より 2004 ▾
- [Journal Article] Effect of strain path on structure and mechanical behavior of ultra-fine grain Cu-Cr alloy produced by equal-channel angular pressing ▾

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