

论文摘要

中国有色金属学报

ZHONGGUO YOUSEJINSHUXUEBAO XUEBAO

第18卷 第11期 (总第116期) 2008年11月

 [PDF全文下载]  [全文在线阅读]

文章编号: 1004-0609(2008)11-1995-07

藕状多孔铜轴向压缩变形行为与本构关系

姚迪, 刘新华, 刘雪峰, 谢建新

(北京科技大学 新材料技术研究院, 北京 100083)

摘要:在氢气压力为0.2 MPa、熔体温度为1 200 °C条件下采用定向凝固法制备 d 45 mm×120 mm的藕状多孔纯铜棒材, 研究藕状多孔金属的压缩变形过程及其影响因素, 分析藕状多孔材料的压缩变形机理, 采用线性回归分析方法建立藕状多孔材料的压缩变形本构关系。结果表明: 藕状多孔铜的压缩变形过程分为弹性变形、以孔壁塑性屈曲为主的大塑性变形和密实化3个阶段; 大塑性变形阶段的主要变形机理是孔壁先呈波形弯曲, 然后产生塌陷和折叠变形; 藕状多孔铜沿平行气孔方向静态压缩时应力—应变曲线受应变速率影响很小。

关键字: 藕状多孔金属; 定向凝固; 变形行为; 本构关系

Axial compressive deformation behaviors and constructive relation for lotus-type porous copper

YAO Di, LIU Xin-hua, LIU Xue-feng, XIE Jian-xin

(Advanced Materials and Technologies Institute, University of Science and Technology Beijing, Beijing 100083, China)

Abstract: Lotus-type porous copper bars of 45 mm in diameter and 120 mm in length were fabricated by unidirectional solidification at hydrogen pressure of 0.2 MPa and molten temperature of 1 200 °C. The compressive deformation process and its effect factors were investigated. The deformation mechanism of lotus-type porous copper was also analyzed and discussed. The compressive mechanical model of lotus-type porous metals was established using the method of linear regression. The results show that the deformation of lotus-typed porous copper consists of three stages of elastic deformation, large plastic yield deformation with mainly pore wall buckling, collapse and densification. The main deformation mechanism in the large plastic deformation stage is that the pore walls buckle in a periodic wave and then collapse and fold. The strain rate has little effect on the compressive stress parallel to the direction of pores.

Key words: lotus-type porous metal; unidirectional solidification; deformation behaviors; constitutive relation

版权所有：《中国有色金属学报》编辑部

地 址：湖南省长沙市岳麓山中南大学内 邮编： 410083

电 话： 0731-8876765, 8877197, 8830410 传真： 0731-8877197

电子邮箱： f-ysxb@mail.csu.edu.cn