论文摘要

Ti-Mo二元合金在β相区的互扩散行为

冯　亮[1, 2]，李金山[1]，黄　磊[1]，常　辉[1]，崔予文[3]，周　廉[1]

(1. 西北工业大学 凝固技术国家重点实验室，西安 710072；
2. 西北有色金属研究院 钛合金研究所，西安 710016；
3. Apartment of Materials Science and Engineering, The Ohio State University, Columbus 4321011, USA)

摘　要：将Ti-Mo纯金属组成扩散偶，在950~1 050 ℃间研究Ti-Mo二元合金在β相区的互扩散行为。利用电子探针(EPMA)测定Ti-Mo扩散偶在扩散区中Mo元素浓度，建立浓度变化曲线，根据浓度曲线用Den Broeder方法计算该扩散偶在β相区的互扩散系数，用Hall方法计算富Mo侧和富Ti侧的互扩散系数。结果表明：互扩散系数与浓度之间存在较强烈的依赖关系；杂质扩散系数可通过Vignes-Birchenall公式获得，并与Hall方法获得的结果进行比较，这两种方法得到的结果比较接近；采用Arrhenius方程获得不同浓度下的扩散激活能和频率因子，二者的峰值均出现在Mo摩尔浓度约为35%处。

关键字：Ti-Mo扩散偶；互扩散；杂质扩散；扩散激活能；频率因子

Interdiffusion behavior of Ti-Mo binary system in β phase

FENG Liang[1, 2], LI Jin-shan[1], HUANG Lei[1], CHANG Hui[1], CUI Yu-Wen[3], ZHOU Lian[1]

（1. State Key Laboratory of Solidification Processing, Northwestern Polytechnical University, Xi'an 710072, China;
2. Titanium Alloy Research Center, Northwest Institute for Nonferrous Metal Research, Xi'an 710016, China;
3. Apartment of Materials Science and Engineering, The Ohio State University, Columbus 4321011, USA）

Abstract: The interdiffusion behavior of Ti-Mo binary system in the β-phase was investigated in the temperature range of 950−1 050 ℃ by using Ti-Mo binary system as diffusion couple. The interdiffusion coefficients were calculated with Den Broeder's method from the concentration profiles of Mo element determined by EPMA. The Hall method was used to determine the interdiffusion coefficients at the Ti-rich and Zr-rich sides. The results show that the interdiffusion coefficients depend strongly on the concentration. These coefficients are compared with the impurity diffusion coefficients which are determined by Vignes-Birchenall equation. The activation energy and frequency factor were calculated by Arrhenius equation at different concentrations, the maximum values of the two parameters appear at y(Mo)≈35%.

Key words: Ti-Mo diffusion couple; interdiffusion; impurity diffusion; activation energy; frequency factor