

Peculiarities of diffusion in Cu-Fe and Co–Cu alloys

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Interest to the diffusion processes in Fe-Cu and Co-Cu systems is provoked by the recent results: absence of advanced grain-boundary diffusion (GBD) [1,2]. The comparison of the diffusion profiles obtained by electron probe microanalysis (EPMA) method near grain boundaries and far from them (in the grain bulk) are the same. In order to avoid the additional material transport associated with cutting and polishing, which can affect on concentration profile the study on specially prepared foils is suggested. For such diffusion study the additional preparation of samples after diffusion annealing is not required. Experiments were performed on copper foils of thickness about 18 μm . Before the diffusion annealing the grain boundaries were visualized by pre-annealing at high temperature due to Mullins' grooving. The diffusant layer (Ni, Fe or Co) was deposited electrolytically. The accumulation of the diffusing element on the opposite side during the diffusion annealing were measured. It was shown that nickel penetrates and on the grain boundary and through the bulk, but the nickel concentration near the grain boundaries is always higher than far from the boundaries

For samples with cobalt and iron the concentrations of these elements on the opposite side were the same in the grain boundary and the bulk for all regimes of annealing.

1 A. A. Itckovich, B. S. Bokstein, A. O. Rodin, *Mat. Lett.* 135, 241 (2014).

2 D. S. Prokoshkina, A.O. Rodin, V. A. Esin, *Phys. Metals Metallogr.* 113, 583 (2012).