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A Steady State Model For Interfacial Reaction And Binary Diffusion In Si-Pd System

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Abstract :

A steady state model that explains an interfacial interaction and diffusion in binary couple of a-b system is proposed in this article. Within the framework of the model, a-atoms diffuse from a-layer of the binary system toward the b-layer and react with b-atoms to form ab-atoms. The layer of ab-atoms that grows on the b-layer, at first, is initially governed by chemical reaction and as time passes it becomes diffusion controlled. The concentration of a-atoms changes as time progresses because they are the dominant diffusing species in the binary system. But the number of b-atoms per unit volume of b-layer remains unchanged because we assume that they are practically immobile. During the chemical controlled phase of the process, the growth of ab-atomic layer is directly proportional to the annealing time. As diffusion reaction dominates the process, the ab-atomic layer thickness increases parabolically with the annealing time. We, therefore, use our model to estimate the thickness of growth of ab-atomic layer with the corresponding critical annealing time at the point of transition between linear and parabolic growth process of the layer. The interfacial reaction and diffusion in binary Si-Pd system is also discussed in line with the theory of our model.

Award :

Yes

Level :

PhD

Supervisor :

Prof.P.A.Selyshchev, selyshchev@gmail.com University of Pretoria

Paper :

Yes

Primary authors : Mr. AKINTUNDE, Samuel (University of Pretoria)

Co-authors :

Presenter : Mr. AKINTUNDE, Samuel (University of Pretoria)

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