

NIST Diffusion Workshop
April 1-2, 2004

Questions about Diffusion Paths

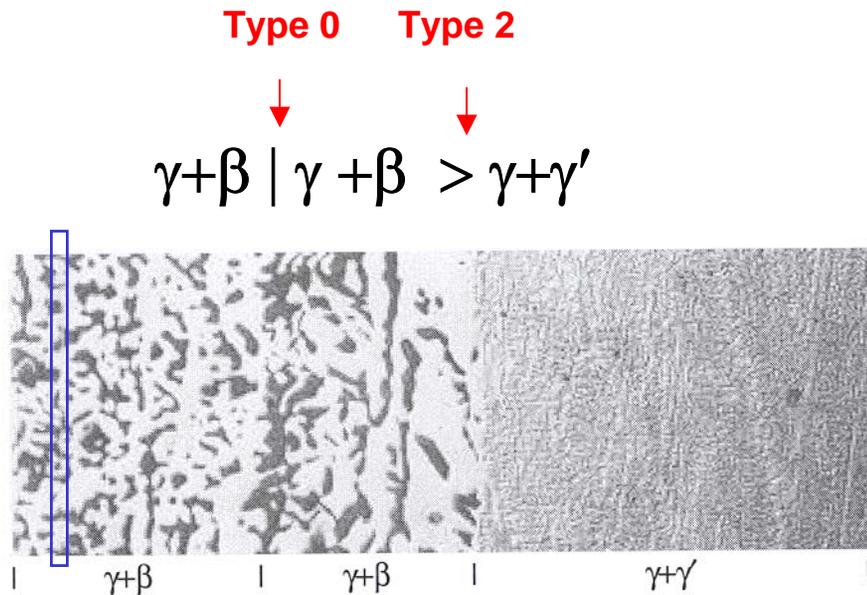
John Morral
The Ohio State University
(614)292-6255, morral.4@osu.edu



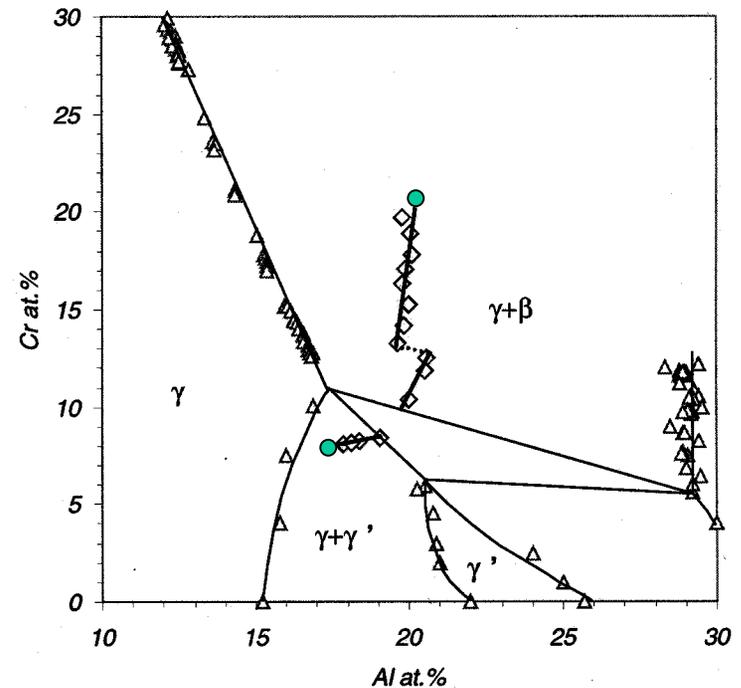
FIVE QUESTIONS

- Why do horns form on zigzag diffusion paths?
- Why do some horns form in the same direction while others form in opposite directions?
- How should diffusion paths appear in de-mixing reactions?
- Why do some diffusion paths cross special points, thereby creating higher order boundaries?
- Why do some diffusion paths follow along phase boundaries?

Interdiffusion Microstructures, Shorthand Notation, Types of Boundaries and Diffusion Paths



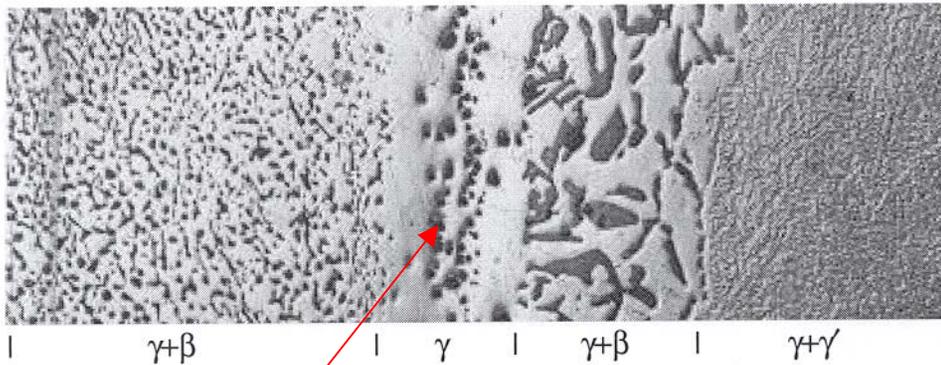
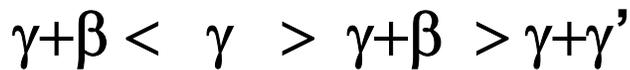
(d) Microstructure of diffusion couple



(c) Diffusion path of diffusion couple

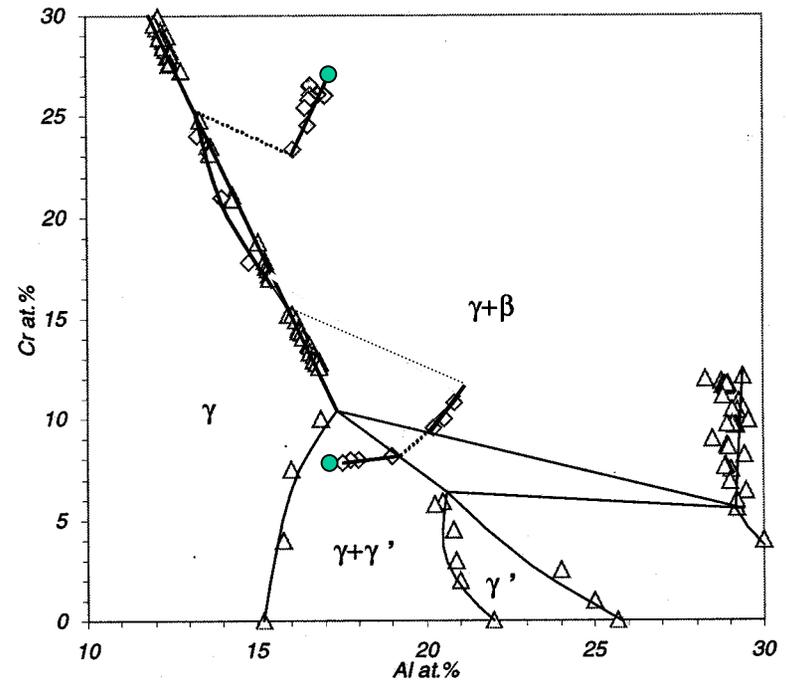
Interdiffusion Microstructures, Shorthand Notation, Types of Boundaries and Diffusion Paths

Type 1 Type 1 Type 2



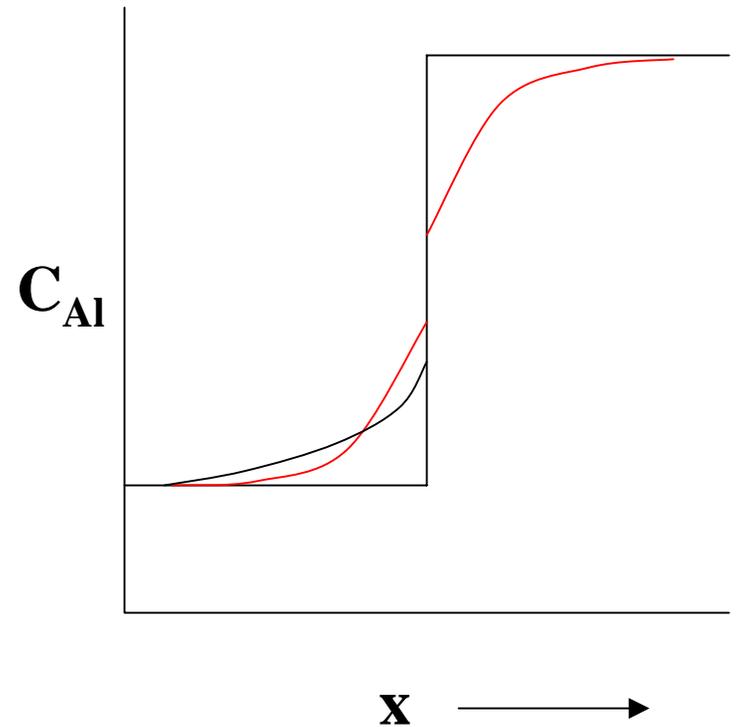
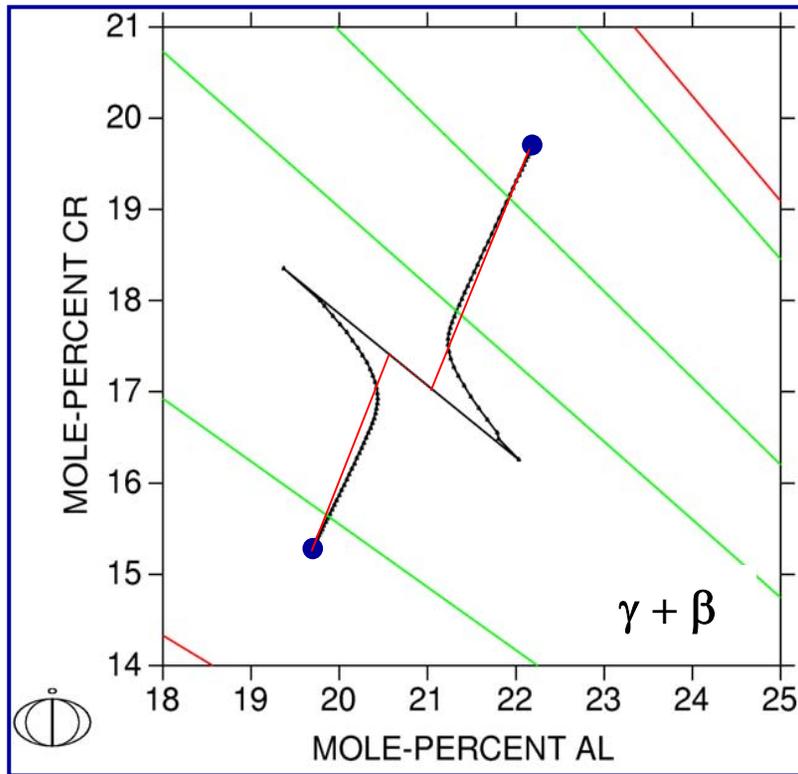
(d) Microstructure of diffusion couple

Kirkendall porosity

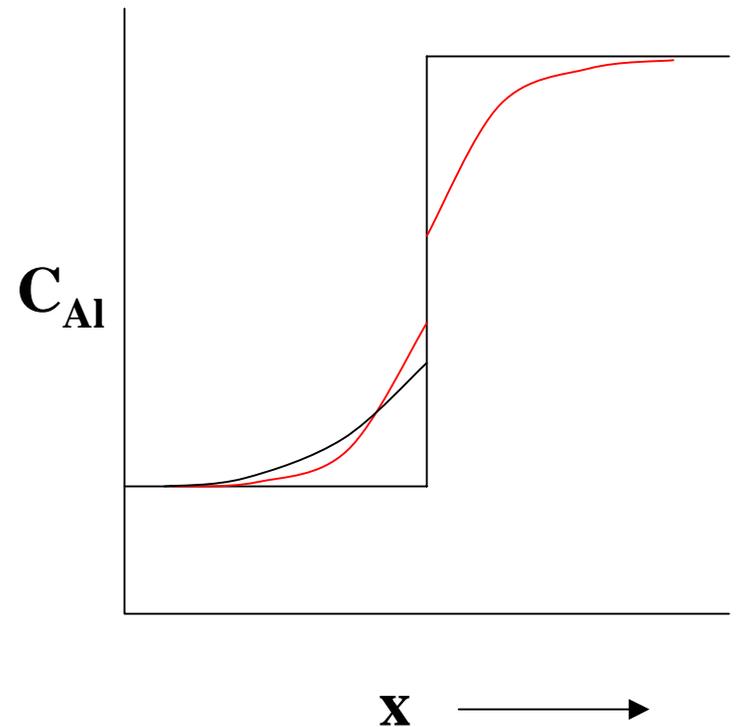
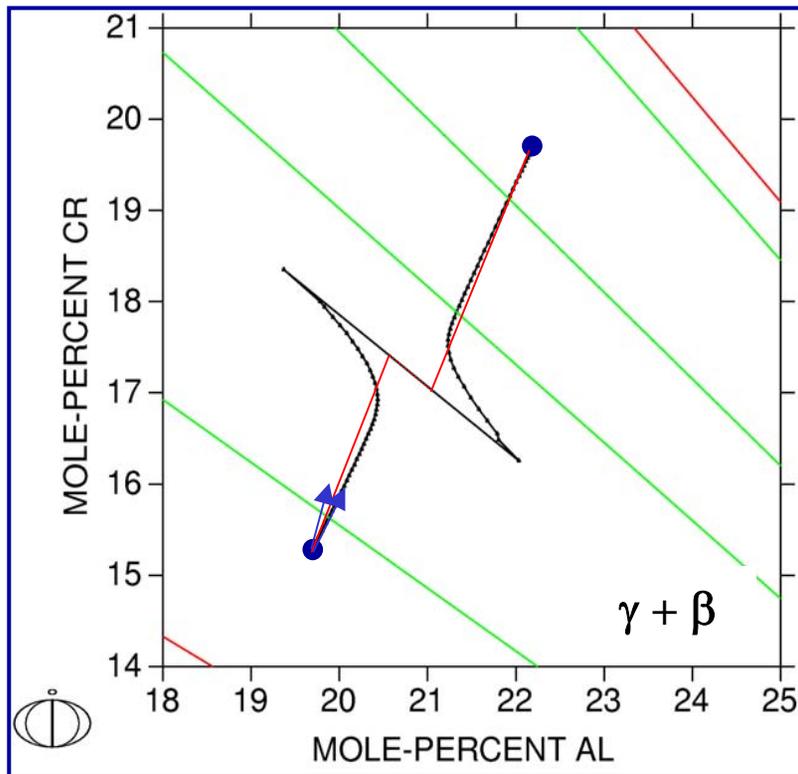


(c) Diffusion path of diffusion couple

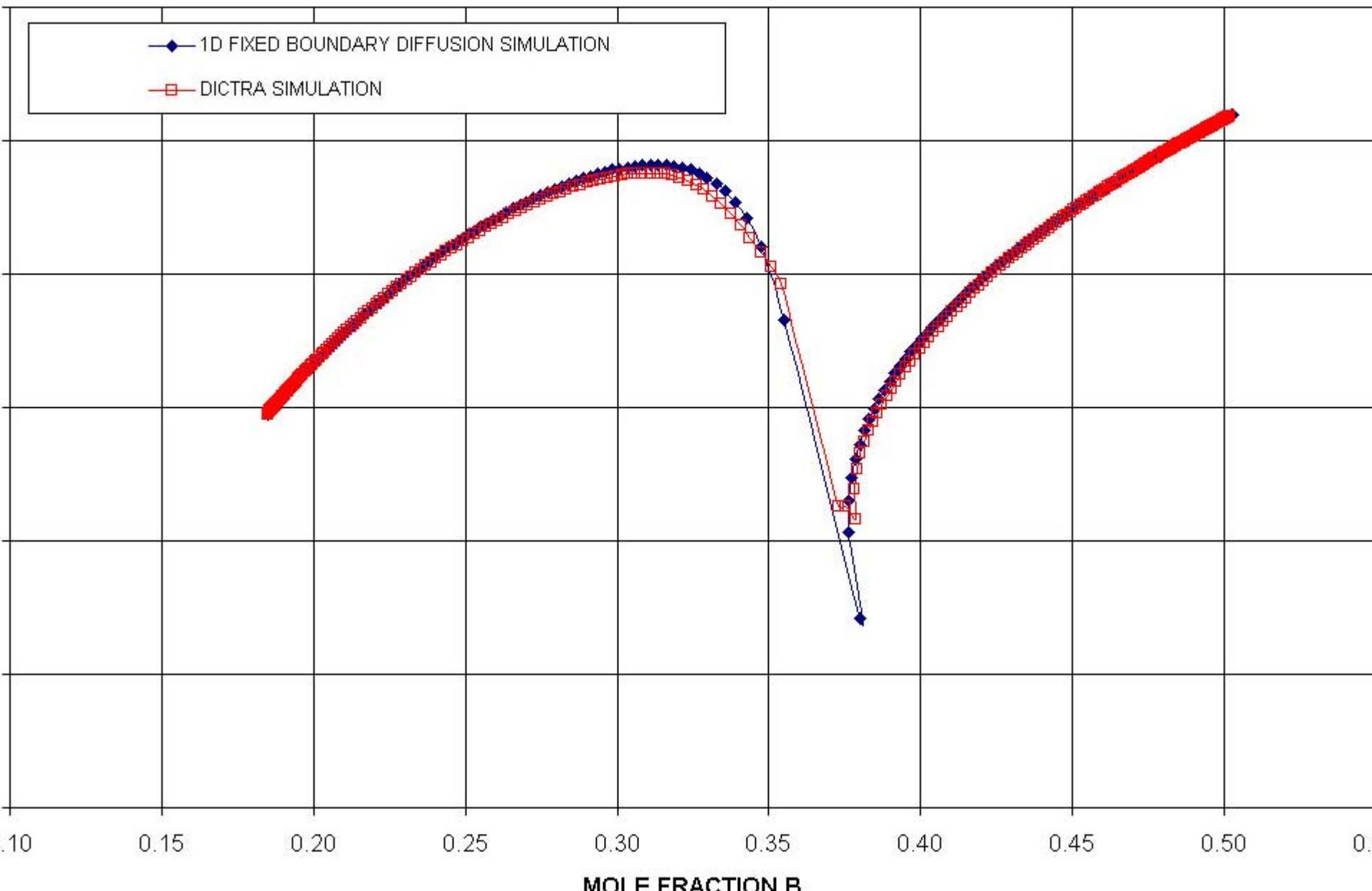
Why do horns form on zigzag diffusion paths?



Why do some horns form in the same direction while others form in opposite directions?



COMPARISON BETWEEN 1D AND DICTRA



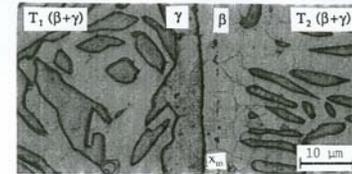
How should diffusion paths appear in de-mixing reactions?

INTERDIFFUSION FLUXES AND TRANSPORT COEFFICIENTS
UNDER MULTIPLE GRADIENTS IN SELECTED TERNARY SYSTEMS

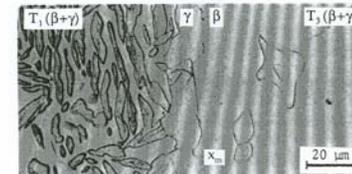
A Thesis
Submitted to the Faculty
of
Purdue University
by
Yong Ho Sohn

In Partial Fulfillment of the
Requirement for the Degree
of
Doctor of Philosophy

December 1998



(a)



(b)



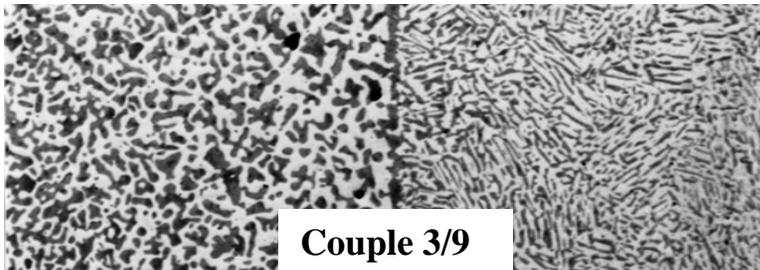
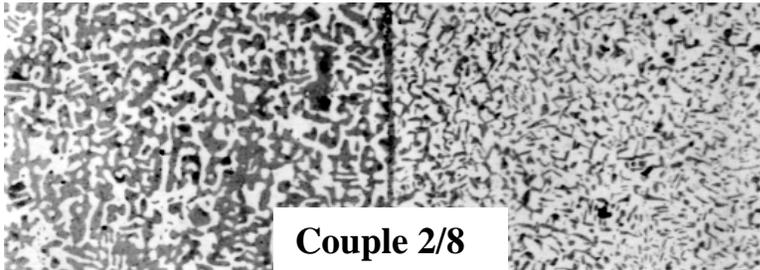
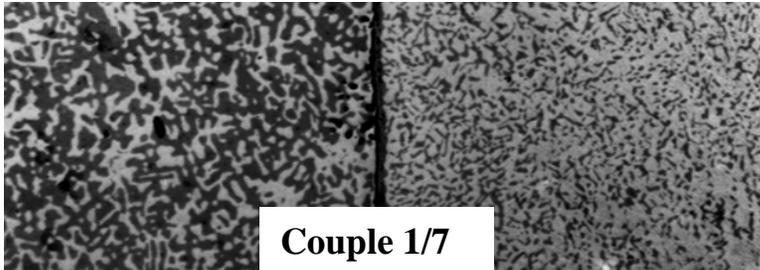
(c)

Figure 57. Diffusion structures of the couples in series VII annealed at 1000°C for 48 hours : (a) T_1 vs. T_2 , (b) T_1 vs. T_3 , (c) T_2 vs. T_3 .

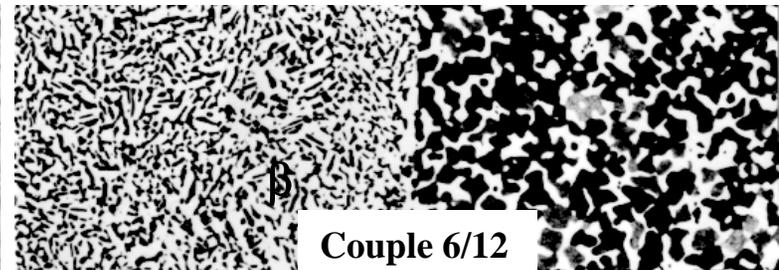
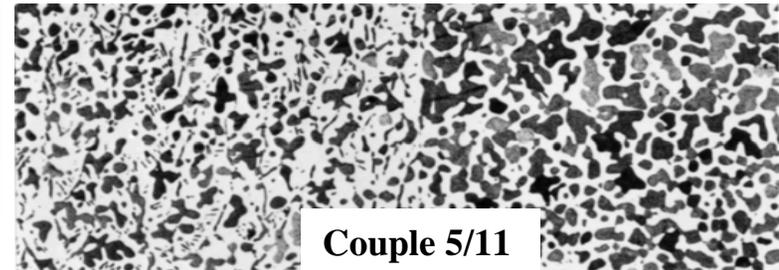
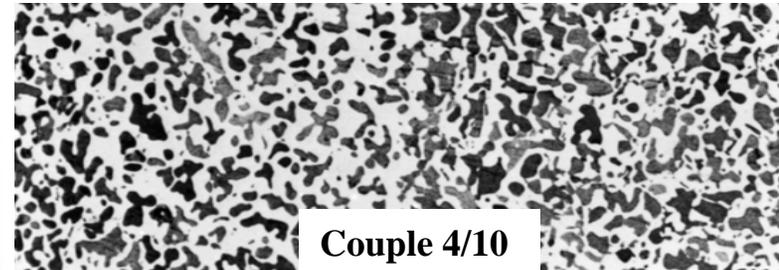
de-mixing of two phases

De-mixing of one phase

β layer formed



NO β layer formed



How should diffusion paths appear in de-mixing reactions?

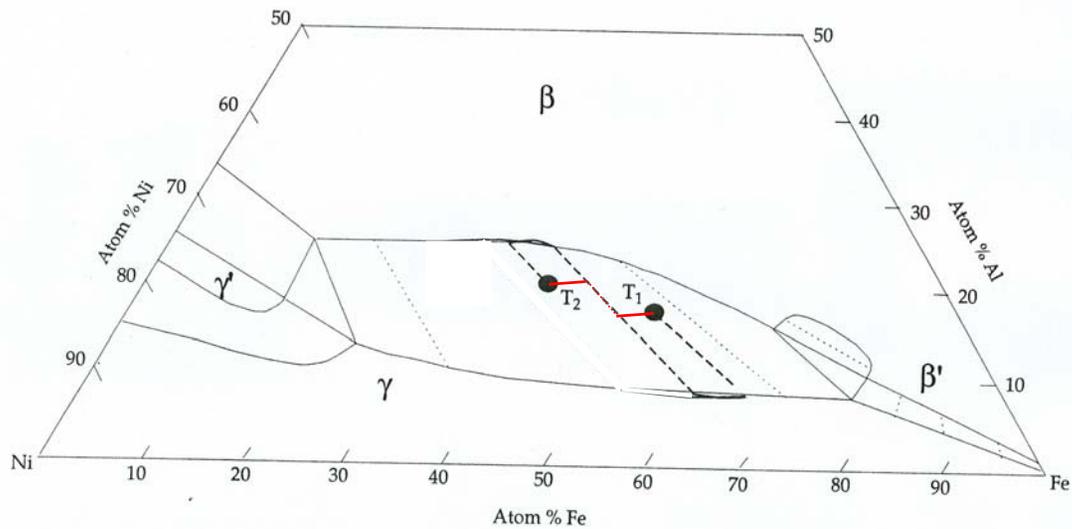
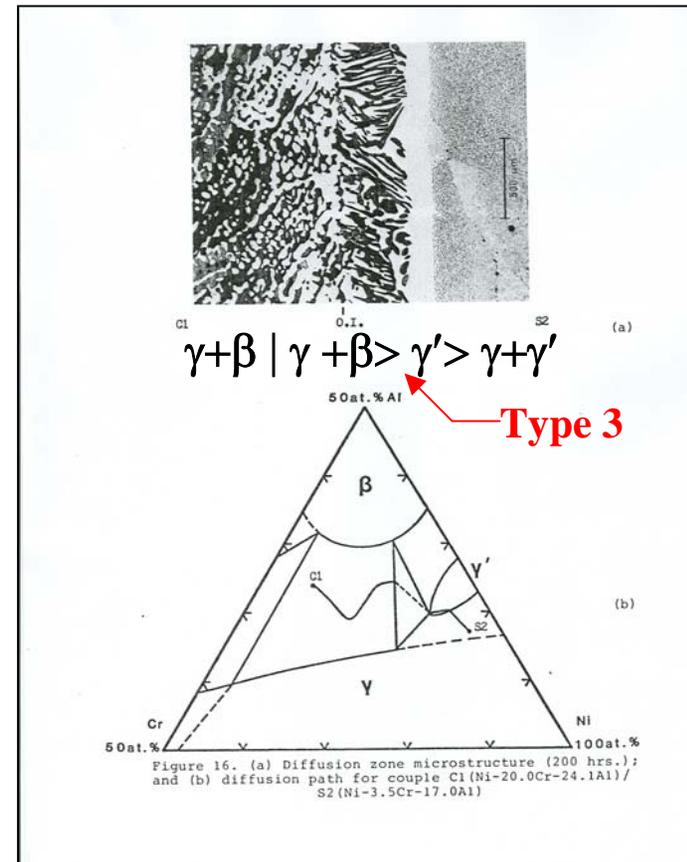
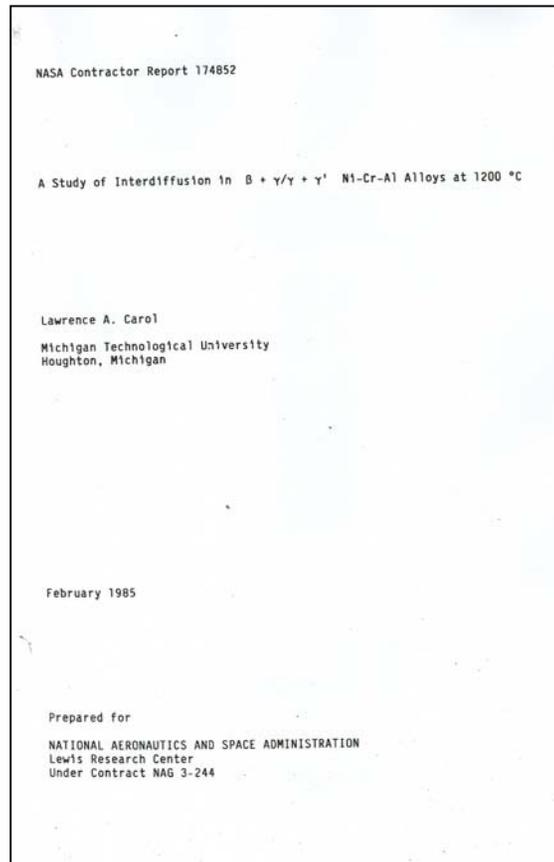


Figure 56. Diffusion path for the couples T_1 vs. T_2 and T_1 vs. T_3 in Series VII annealed at 1000°C for 48 hours.

Why do some diffusion paths cross special points, thereby creating higher order boundaries?



Why do some diffusion paths cross special points, thereby creating higher order boundaries?

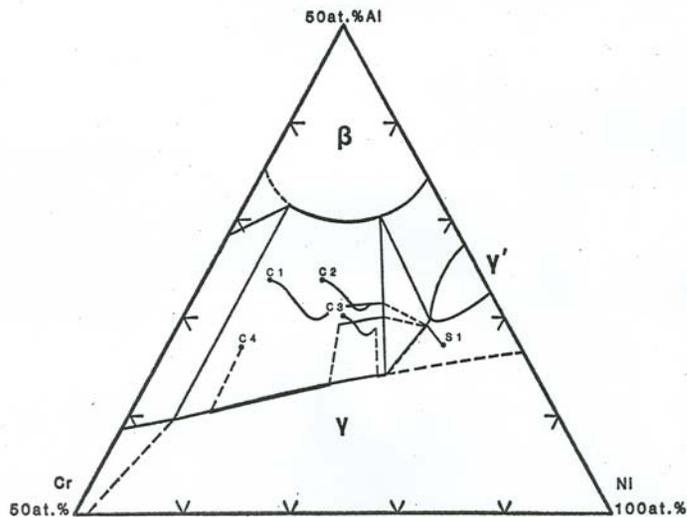


Figure 49. Diffusion paths for couples in Series 1 (C1, C2, C3, C4/S1).

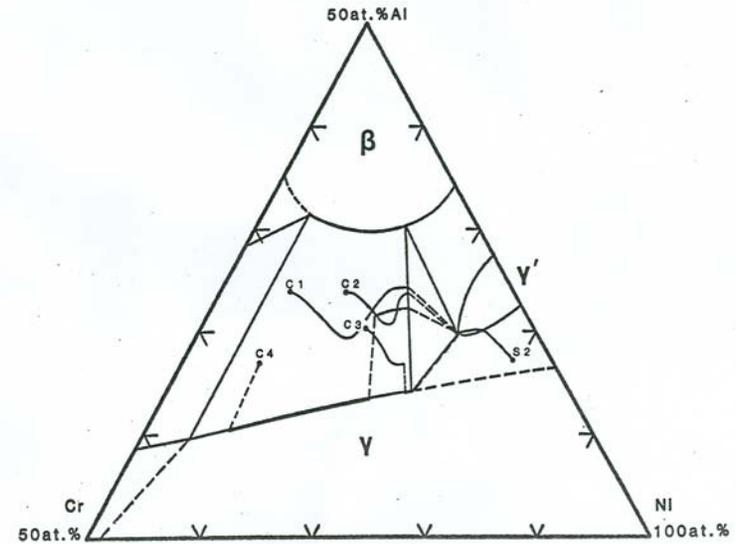


Figure 50. Diffusion paths for couples in Series 2 (C1, C2, C3, C4/S2).

Why do some diffusion paths follow along phase boundaries?

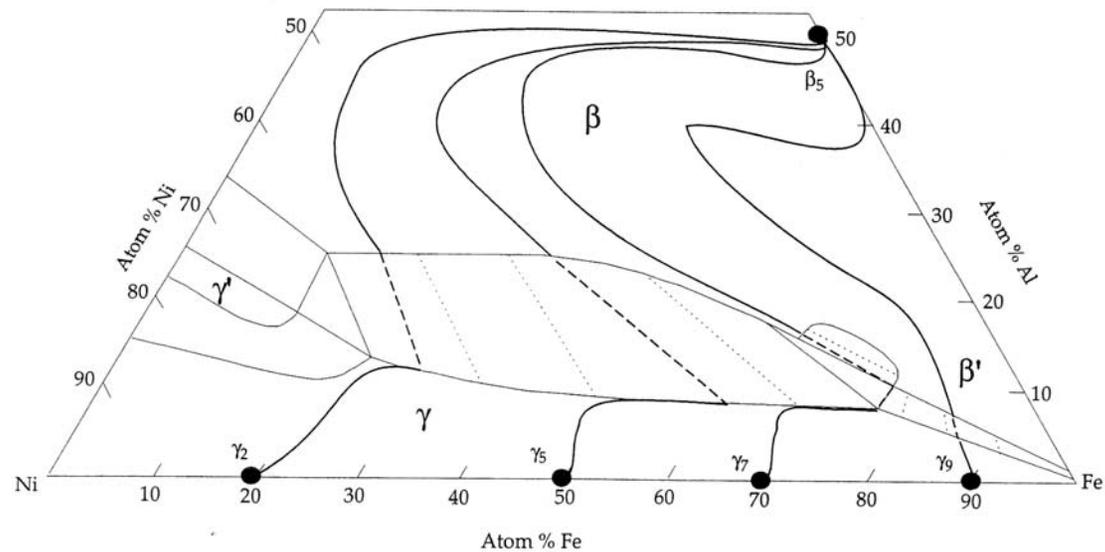


Figure 46. Diffusion paths for the couples in series II annealed at 1000°C for 48 hours.