

THE EFFECT
OF SELF-SATURATION IN AN ALLOY
AS A CRITERION OF THE BEGINNING
OF THE COALESCENCE STAGE

A.S. Shirinyan, M.P. Kudin

B. Khmel'nyts'ky Cherkasy National University
(81, Shevchenko Blvd., Cherkasy 18031, Ukraine;
e-mail: *shirinyan@phys.cdu.edu.ua*,
aramshirinyan@ukr.net)

S u m m a r y

A numerical solution of the problem concerning the diffusion-controlled process of growth and coalescence of new-phase particles in the mean field approximation is discussed. The model allows one to investigate the main stages of the decay (the stage of independent growth, intermediate stage, and coalescence), as well as transitions between them, in detail. It is shown that the size dispersion of new-phase particles at the stage of independent growth decreases. It is obtained that, in the framework of the mean field approximation, one can observe the self-saturation effect at the initial stage of coalescence. Self-saturation is characterized by the "inverse" behavior of saturation, namely by the increase of the concentration of dissolved atoms corresponding to a new phase, as well as by the "inverse" behavior of the mean and critical radii of new-phase particles – their decrease. The amplitude of this effect is small and depends on both the volume fraction of the new phase and the initial supersaturation. The result was verified for various initial size distributions of particles. The self-saturation effect can be considered as a criterion (indicator) of the beginning of the coalescence stage.