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INTERFACE MOTION IN NANOSTRUCTURES

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We showed that in phase separating systems, the shift kinetics of the interface separating the two matrices in a diffusion couple is influenced on the atomic/nano scale by the composition–dependent diffusion coefficient and the restricted solubility. The interface shift is not proportional to the square root of the time as expected from the classical theories (anomalous diffusion) [1]. We verified this prediction experimentally [2].

We derived that an initially diffused interface may sharpen by diffusion in completely miscible systems even considering different types of stresses [3]. The stress effects influence only the kinetics of the process. We observed the interface sharpening experimentally, too [4].

In computer simulations we found that so-called "surfactant" phenomenon in phase separating systems, which was predicted previously by other authors, does not exist in real systems [5].

Later, we extended our calculations to understand the atomic details of reaction diffusion, i.e. when an ordered phase grows in the diffusion zone (DZ). On the basis of an atomic model, we show a possible resolution of a long standing diffusion paradox, according to which the growth rate of DZ tends to infinite with decreasing time, or equivalently the atomic current tends to infinite. Moreover, we also gave the atomic interpretation of the so-called reaction kinetics coefficient [6].

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