

Abstract Submitted  
for the MAR12 Meeting of  
The American Physical Society

**Reaction kinetics in the cell membrane: confining domains lead to reaction bursts** ZIYA KALAY, TAKAHIRO FUJIWARA, AKIHIRO KUSUMI, Kyoto University - Inst. for Integrated Cell-Material Sciences — Our goal is to reveal the effects of confining domains such as those observed in cell membranes on the kinetics of reversible reactions in two-dimensions. During the last two decades, single molecule tracking experiments showed that proteins and lipids are temporarily confined in the compartments of a meshwork induced by the actin cytoskeleton, while diffusing laterally in the plasma membrane. It has been clearly demonstrated that the presence of these compartments significantly hinders the diffusion of membrane molecules. Nevertheless, how confinement affects the interaction between membrane molecules and the regulation of signaling has still not been clarified. Using Monte Carlo simulations and the mathematical theory of diffusion, we showed that the presence of compartments leads to reaction bursts, during which the number of reactions an individual molecule experiences rises sharply, but briefly. Surprisingly, we found that the mean reaction rate does not depend on whether compartments exist or not. However, our results show that the variance of the rate depends strongly on the presence of confinement effects, which turns out to be an indicator of a profound change in the temporal pattern of reaction events: bursts of reactions instead of constant but low yield.

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Date submitted: 05 Nov 2011

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