

# PROBING SINGLE-MOLECULE ION CHANNEL CONFORMATIONAL DYNAMICS IN LIVING CELLS

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Stochastic and inhomogeneous conformational changes regulate the function and dynamics of ion channels that are crucial for cell functions, neuronal signaling, and brain functions. We have developed a new combined approaches of using single ion channel patch-clamp electrical recording and single-molecule fluorescence imaging for probing ion channel conformational changes simultaneously with the electrical single channel recording. By combining real-time single-molecule fluorescence imaging measurements with real-time single-channel electric current measurements in artificial lipid bilayers and in living cell membranes, we were able to probe single ion-channel-protein conformational changes simultaneously, and thus providing an understanding the dynamics and mechanism of ion-channel proteins at the molecular level. We will focus our discussion on the new development and results of real-time imaging of the dynamics of gramicidin, colicin, and NMDA receptor ion channels in lipid bilayers and living cells. Our results shed light on new perspectives of the intrinsic interplay of lipid membrane dynamics, solvation dynamics, and the ion channel functions.

## Reference:

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